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Department of Labor and Industry

DIVISION OF WORKERS' COMPENSATION

Bureau of Safety

Rules Relating to Logging Departments and Logging Operations in Montana

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The purpose of this publication is to esta
of minimum safety standards for logging
and logging operations within the state of

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It should be recognized that the extreme
varied operations and activities of the logg
gives rise to many various types of indust
To attempt to identify each such hazard
proper safety practices to nullify it would
volume too cumbersome for practical reference. Such a volume would hinder rather than aid the cause of accident prevention.

Therefore, it is the intention of the Division of Workers' Compensation not to penalize the industry with unduly voluminous restrictions but to encourage increasing attention to the elimination of industrial hazards through providing a basic framework of safety policy and practice which is considered to be a minimum acceptable standard.

It is the duty of every employer to provide reasonably safe and healthful working conditions for their employees and to do everything reasonably necessary to protect their life, health, and safety. Concurrently, it is the duty of every employee to cooperate to the fullest with his employer and to perform his work in a reasonably safe manner, recognizing hazards and avoiding and preventing accidents wherever possible.

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Therefore, it is hereby directed that each employer shall augment these minimum safety standards with reasonably detailed safety rules covering the hazards peculiar to each industrial operation.

Copies of the standards which are incorporated by reference may be examined at, or obtained when available from, the Bureau of Safety, Division of Workers' Compensation, 5 South Last Chance Gulch, Helena, Montana 59601.

The Division wishes to thank the many Montana Loggers who contributed their time and effort in assisting us to develop and promulgate these standards.

Robert J. Robinson
Administrator
Division of Workers' Compensation

Effective November 1, 1986

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SECTION 1.
GENERAL REQUIREMENT

A. AUTHORITY OF RULES

(1) These rules are adopted according to the authority vested in the Division of Workers' Compensation by Section 50-71-106 M.C.A., 1979.

B. APPLICATION

(1) These rules apply to practices of sawmill logging or related activity and the methods and equipment used in other operations associated with the preparation and movement of logs from timber sites to delivery points.

C. SCOPE

(1) Any situation or condition not specifically covered by these rules is subject to other laws administered, or rules adopted, by the Division of Workers' Compensation.

D. PURPOSE

(1) The purpose of these rules is to prescribe Minimum Safety Standards for all persons employed in the logging and logging related industries.

E. PLANNING

(1) Plans shall be made in advance for the safety of workers in logging operations. Persons in charge shall see that predetermined plans are followed.

F. SAFETY PROGRAMS AND COMMITTEES

(1) Safety programs shall be conducted in accordance with the standards adopted by the Division of Workers' Compensation.

(2) Safety committees shall be organized whenever possible and every effort shall be made to make their work successful. Employers should voluntarily establish safety committees and act on the reports made by such committees.

G. EMPLOYERS' RESPONSIBILITIES

(1) Management shall establish and supervise the following activities:

(a) Provide a working environment which complies with safety rules and regulations herein described;

(b) Report directly to the Division of Workers' Compensation any accident resulting in a fatality;

(c) Equipment involved in an accident resulting in an immediate fatality shall not be moved until a representative of the Division, the sheriff, or coroner investigates the accident and releases the equipment. The equipment may be moved when it is essential to prevent further accidents.

(2) Supervisors of logging crews must account for all workers when:

(a) Work ceases;

(b) When work is discontinued before regular quitting time; or

(c) When transporting a partial crew.

H. EMPLOYEES' RESPONSIBILITIES

(1) All employees shall make it their responsibility to keep co-workers free from accidents and personal equipment in good working condition. The worker shall study and observe these and any other safety standards governing his work.

(2) Each employee shall use and maintain all protective equipment or apparel that is required or provided.

(3) The responsibilities of employees in industrial safety shall be as follows:

(a) Immediately report to the foreman or employee safety committee all unsafe conditions and practices.

(b) Ascertain from the foreman where medical help may be obtained if needed.

(c) Avoid practical jokes and "horseplay".

(d) Make a prompt report of every accident to the foreman or person in charge.

(e) Be certain safety instructions are understood completely before work begins.

(f) Attend and participate actively in all safety meetings.

(g) Set a good safety example for fellow workers by applying the principles of accident prevention and by observing safe practice rules.

(h) Do not report to work while under the influence of intoxicants.

(4) No person in possession or under the influence of intoxicating liquor or drugs shall be permitted near worksites.

I. WEATHER CONDITIONS

(1) When extreme weather or other conditions are such that hazards arise, additional precautions shall be taken to insure safe operation. If the operation cannot be made safe because of these conditions, work shall be temporarily discontinued.

J. WORKING ALONE

(1) A definite procedure for checking the welfare of all workers shall be instituted and all workers so advised.

(2) The employer shall assume the responsibility of work assignments so that no worker, including maintenance personnel, shall be required to work in a location away from visual or audible signal contact with another person who could render assistance in an emergency.

(3) A crew of at least two (2) persons shall be in visual or audible signal contact with one another in any operation where cutting, yarding, loading or any combination of these duties is occurring. (Motor noise is not acceptable as a signal.) The 2 person crew minimum does not apply to operators of motor vehicles, watchmen or certain other jobs which are single worker assignments.

K. NOISE LEVEL

(1) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table L-9.

(2) When employees are subjected to noise

exposures exceeding those listed in Table L-9, feasible administration or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table L-9, personal protective equipment shall be provided and used.

(3) In cases where sound levels exceed the values in Table L-9, a continuing, effective hearing conservation program shall be administered. A minimal program shall include:

(a) Noise exposure evaluation of employees.

(b) Engineering controls for those over the threshold limit values.

(c) Audiometric testing at least once each year for those employees subjected to sound levels exceeding those listed in Table L-9.

(d) Hearing protection shall be maintained as near as possible to its original effectiveness and shall be fitted by a responsible person. Plain cotton is not an acceptable protective device.

TABLE L-9
PERMISSIBLE NOISE EXPOSURES

Duration per day, hours	Sound level DBA slow response
8	90
6	92
4	95
3	97
2	100

1½	102
1	105
½	110
¼ or less	115

L. PROTECTIVE APPAREL

(1) All employees exposed to overhead hazards shall wear protective hard hats.

(2) Clothing shall be worn which is appropriate to the duties performed and conditions encountered.

(3) Loose or torn clothing shall not be worn near moving machinery.

(4) Suitable gloves shall be worn when handling cables.

(5) Calked boots or safety soled shoes shall be worn by persons whose work requires their use.

(6) All inexperienced sawyers shall wear protective chaps.

M. CAMPS

(1) A camp used in a logging operation shall comply with the following requirements:

(a) Trees and snags which may constitute a hazard to persons in the camp area shall be felled.

(b) The Montana Department of Health and Environmental Sciences rules of sanitation must be observed as to water, toilets, washrooms, refuse, etc.

N. TRANSPORTATION OF CREWS

(1) Motor vehicles used for transporting crews shall be covered against weather and shall be regularly inspected for safe operation. No loose tools, equipment or materials shall be transported inside crew trucks with employees.

(2) An unobstructed aisle shall be maintained in all crew buses.

(3) When it becomes necessary, under emergency conditions, to transport more persons than the seating capacity of the vehicle, all workers without seats shall ride within the vehicle. Under no circumstances shall workers ride on fenders or running boards.

(4) No person shall ride in or on any vehicle with his legs hanging over the ends or the sides. A secure safety bar, chain or cable shall be placed across the rear opening of all crew trucks which are not equipped with roofs.

(5) All crew buses shall have enclosed racks or boxes to confine saws and other tools and equipment when transported inside the vehicle.

(6) In an emergency, dump trucks may be used to transport workers if equipped with adequate safety chains or locking devices which will eliminate the possibility of the body of the truck being raised while workers are riding in it.

(7) Highly flammable materials shall not be carried in any vehicle while it is being used to transport workers but may be carried on the outside of the vehicle in an approved manner.

(8) Explosives shall not be carried in or on

any vehicle while it is being used to transport workers.

(9) Exhaust systems shall be installed and maintained in proper condition, and shall be designed to eliminate any exposure to exhaust gases and fumes.

(10) In addition to the regular entrance all buses shall have an emergency exit on the opposite end.

(11) Some mechanical means of signaling shall be provided between the driver and the persons being transported when they are in separate compartments.

(12) All crew buses regularly used for carrying crews shall be equipped with stretcher, two blankets, splints, approved first aid kit, fire extinguishers, and an emergency light.

(13) All vehicles used for transporting crews should have some means of heating and lighting the passenger area. Hot water radiator type heaters are recommended. If stove type heaters are used, stoves shall be solidly anchored and all doors, lids, etc., shall have locking devices. All stove pipe shall be welded or be in one continuous piece. An approved guard shall be installed around the stove to eliminate accidental contact.

(14) A fire extinguisher of not less than 5 B:C capacity shall be kept in a convenient location and maintained in a proper working condition.

(15) A brake test shall be made immediately after vehicle is placed in motion.

O. TOOLS AND EQUIPMENT

(1) The employer shall be responsible for the safe condition of all tools provided.

(2) Handles shall be sound, straight and tight fitting.

(3) Driven tools shall be dressed to remove any mushrooming.

(4) Cutting tools shall be kept sharp and properly shaped.

(5) Wood hooks and pickaroons of good grade steel shall be used.

(6) Defective tools shall be removed from service.

(7) Tools shall be appropriate for their use. They shall be of proper size and used in a safe manner.

(8) Safe storage facilities shall be provided for hand tools.

(9) Tools shall be stored in the provided location when not in use.

(10) Periodic inspection shall be made to assure all tools are serviceable.

(11) Case hardened, or battered sledges and wedges shall not be used.

SECTION 2.
TIMBER CUTTING AND CLIMBING

A. SAWYERS AND FALLERS

(1) Sawyers must give timely warning to other persons in the vicinity where the tree is being felled, taking notice that such persons are not only out of reach of the tree, but also out of danger of possible sidewinders, snags of other trees which may be knocked over by the tree being felled.

(2) No tree within the range of a traveled road or railroad track shall be felled unless a flagman or barricade is used to warn approaching traffic.

(3) Fallers must insure that a way of escape is clear before tree is felled.

(4) The minimum distance between sawyers shall be twice the height of the trees being felled.

(5) Undercuts are required and shall be deep enough to safely guide the trees.

(6) Backcuts shall be as level as possible and they shall always be above the upper cut of the undercut.

(7) While wedging, fallers shall watch for limbs and other material which might be jarred loose.

(8) No sawyer shall work out of hearing distance of his partner or some other person who can respond to an emergency.

(9) In falling timber near a standing tree or snag, fallers shall watch for limbs and tops thrown back, and for fallen or standing trees which may be struck by the falling tree.

(10) Workers shall not stand near the stump as the tree falls and when possible this distance shall not be less than 20 feet.

(11) At no time shall sawyers work if the wind is strong enough to prevent the falling of trees in the desired direction, or when vision is impaired by dense fog or darkness.

(12) Before falling a tree or snag the sawyer must survey the overhead dangers and proceed accordingly.

(13) When there is danger of kickback from a sapling, it must be either undercut or felled.

(14) All heavy leaners must have deep undercuts and heavy side cuts as necessary.

(15) Sawyers must give advance warning to all persons within range of any log which may roll after being cut.

(16) Sawyers shall not work on hillsides immediately below each other or below other operations where there is a danger of skidding or rolling trees.

(17) The sawyers shall carefully examine a felled tree before making a cut to determine which way the log will roll, drop, or swing when the cut is completed. The safest position thus determined shall be used in finishing the cut.

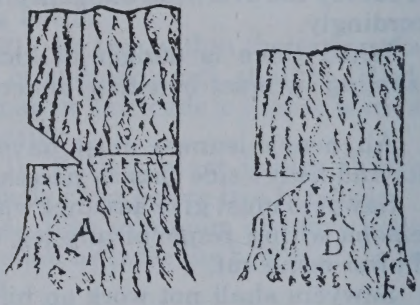
(18) Sawyers shall not work on the downhill side of a log unless absolutely unavoidable.

(19) A positive method that will prevent accidental cutting of necessary holding wood shall be established. Particular care shall be taken to hold enough wood to guide the tree or snag and prevent it from prematurely slipping or twisting from the stump.

(20) All logs not completely cut off shall be called to the attention of the woods boss.

(21) Sawyers using axes must be careful that the chopping range is unobstructed when swinging.

(22) Recommended Undercuts:



A. Conventional undercut. Can be made with parallel saw cut and axe diagonal cut or both cuts with the saw. Generally used on trees of small diameter.

B. Both cuts made with the saw. Same as "A" except that waste is put on the stump.

B. DANGEROUS TREES AND SNAGS

(1) Dangerous trees and snags within reach of landings, roads, or rigging shall be felled before regular operations begin.

(2) All snags judged to be dangerous by the sawyer shall be felled.

(3) Inexperienced workers shall not buck windfalls or snags unless accompanied by an experienced sawyer.

(4) Trees shall be felled to prevent hang-ups.

(5) Particular care shall be taken in working around and falling snags. Dangerous bark shall be removed from snags in preparation for falling. Stump height shall be adequate enough in the judgement of the sawyer to allow maximum visibility and freedom of action during the falling operation.

(6) Whenever possible, snags shall be felled in the direction of lean, using a suitable undercut to avoid vibration of wedges.

(7) In thinning operations dangerous trees and snags shall be felled during the first thinning.

(8) Loose rocks, stumps, etc., shall be removed from roadside banks if they present a hazard to travel or other operations.

(9) A tree lodged in another tree should be knocked down by falling a third tree against it, or it shall be pulled down by a line attached to a skidder or yarder. Extreme care shall be exercised when working around the "hung" or the "supporting" trees.

(10) When a hung tree must be left unattended, the tree shall be marked and identified by a predetermined method.

(11) Down logs uphill from sawyers or buckers shall be examined and propped or otherwise secured if dangerous.

C. CHAIN SAW OPERATIONS

(1) Chain saw operators shall:

(a) Follow manufacturer's instructions as to operation and adjustment;

(b) Inspect the saws daily to assure that all handles and guards are in place and tight, that all controls function properly, and that the muffler is operative;

(c) Start the saw only when firmly supported;

(d) Be certain of footing and clear away brush which might interfere before cutting;

(e) Not use the saw to cut directly overhead or at a distance that would require the operator to relinquish a safe grip on the saw.

(f) Shut off the saw when carrying it for a distance greater than from tree to tree or in hazardous conditions such as slippery surfaces or heavy underbrush. The saw may be at idle speed when carried short distances.

(g) Carry the saw in a manner to prevent contact with the chain and muffler.

(h) Not fuel the saw near potential sources of ignition.

(i) Not use engine fuel for starting fires or as a cleaning solvent.

(2) Chain saws shall have the sprocket and drive end of the bar adequately guarded.

(3) Combustion-engine driven power saws

shall be equipped with a positive means of stopping the engine.

(4) Combustion-engine driven power saws shall be equipped with a clutch. Saws with faulty clutches shall not be used.

(5) Combustion-engine driven power saws shall be equipped with an automatic throttle control which will return the motor to idling speed upon release of the throttle.

(6) Power saw motors shall be stopped while being fueled.

(7) Operators or helpers shall not place their hands on the bar while the motor is running.

(8) Mechanical falling devices shall be used with suitable and substantial safeguards to protect the operator and nearby workers.

D. GENERAL CLIMBING REQUIREMENTS

(1) Trees shall not be topped during windy weather.

(2) At no time shall topping, rigging-up, or stripping be done when visibility is impaired.

(3) The climber shall be an experienced logger with knowledge of safe tail tree rigging.

(4) No line attached to a tree in which a climber is working shall be moved except on a signal from the climber.

(5) Yarding of any type shall not be conducted within reach of the guylines of a tree in which a climber is working.

(6) The climber shall be equipped with a

safety belt with double "D" rings on each side of the belt, steel spurs and a wire-core hemp climbing rope or an approved chain. This assembly shall have a breaking strength of not less than 5400 pounds.

(7) The climbing rope shall be attached to both of the two "D" rings at each side of the belt, or passed through the "D" rings and around the body. A secondary safety device shall be used when snap hooks are used.

(8) All climbing equipment shall be kept in good condition.

(9) An extra set of climbing equipment and a person with some climbing ability shall be available.

(10) When power saws are used in topping or limbing standing trees, the weight of the saw used shall not exceed thirty (30) pounds.

(11) Tools used by the climber shall be safely secured to his belt or person.

(12) When the climber is required to top trees ahead of operations, another worker shall be assigned to stay in constant contact with the climber at all times.

(13) An experienced person, stationed out of danger from falling objects, shall be assigned to transmit the climber's signals.

(14) Spurs shall be long enough to hold in any tree in which they are being used.

(15) Lineman hooks shall not be used as spurs.

(16) Spurs shall be removed when the climber is not in a tree.

(17) Attaching the pass line to a pickup or any moving equipment is prohibited.

(18) While a climber is working in a tree, other workers shall keep a safe distance from it.

(19) The climber shall give warning if any equipment or material is in danger of falling or is to be dropped deliberately.

(20) Noisy equipment such as power saws, skidders and shovels shall not be operated in the landing area if such noise interferes with the climber's signals.

E. SELECTION AND PREPARATION OF TAIL TREES

(1) Tail trees shall be examined carefully for defects before being selected. They shall be sound and of sufficient diameter to withstand the strains to be imposed.

(2) Trees having defects that impair their strength shall not be used for tail trees.

(3) Douglas Fir, Western Larch or Ponderosa Pine should be used as tail trees, if available, but other species may be used if they are tested to insure that they can withstand the strains to be imposed.

(4) All tail trees that create a hazard to workers shall be topped short enough to be stable when guyed.

(5) Tail trees shall be barked or tree plates shall be used.

(6) Climbers shall select the location for hanging rigging before topping the tree, and in no instance shall more than sixteen (16) feet nor

less than six (6) feet of the topped tree extend above the rigging location.

(7) Tree spikes used by the climber to hang rigging shall be removed before the tree is used.

(8) Loose rigging shall be removed or securely fastened.

SECTION 3.
RIGGING

A. GENERAL REQUIREMENTS

(1) Rigging and all parts thereof shall be of a design and application to safely withstand all expected or potential loading to which it will be subjected.

(2) The placing, condition, and the operation of rigging shall be such as to insure safety to those who will be working in the vicinity.

(3) Rigging shall be arranged and operated so that it will not foul or saw against lines, straps, blocks, or other equipment.

(4) In no case, shall the allowable loading or stress imposed be more than one-half of the cable rated breaking strength of any parts of the rigging. This shall not apply to chokers.

(5) Chokers shall be of less tensile strength than the mainline.

(6) The determining factor in rigging-up shall be the amount of rated drum pull which a machine can deliver on each line. For practical application, equipment which requires the use of mainlines of 1-1/8 inch and larger shall be considered heavy equipment.

(7) Equipment shall be classed according to the manufacturer's rating. Where low gear ratios or other devices are installed to increase the power of equipment, the size of the rigging shall be increased so that it will safely withstand the increased strains.

(8) Running lines shall be arranged so that workers will not be required to work in the bight.

(9) Workers shall move out of the bight of lines before the lines are moved.

(10) Reefing or similar practices to increase line pull are prohibited.

(11) All employees are prohibited from riding hooks, lines, or any other rigging, except where such equipment has or is provided with handholds, footholds, or other necessary means for safe riding, and where lifting of employees by such devices will eliminate a greater hazard.

(12) Rigging shall be moved only by standard signals or approved alternate system.

B. INSPECTION OF RIGGING

(1) A thorough inspection of all blocks, straps, guylines, and other rigging shall be made before they are placed in position for use. This inspection shall include an examination for damaged, cracked, or worn parts, loose nuts and bolts, lubrication, and the condition of straps and guylines. The repairs or replacements necessary for safe operation shall be made before the rigging is used.

(2) The employers shall make and maintain annual records of all rigging which was thoroughly inspected, and shall make such records available for examination. The records shall include the date of inspection and the signature of the person making the inspection.

C. GUYLINES

(1) The specific requirements for guylines as herein contained are assumed to be necessary for reasonable compliance with the safety factors required for rigging. Variations giving equivalent strength may be permitted. If, however, in any given circumstance it is the opinion of the Division that additional guys or guys of larger diameter are reasonably necessary, they shall be added.

(2) Guylines shall be of plow steel or better material in good condition.

(3) Guylines shall be sufficient in number, condition, and location to develop stability and strength equivalent to the ultimate or breaking strength of any component part of the rigging in the system.

(4) Guylines shall be alternately passed around the tree in opposite directions to prevent twisting of tree. Guylines shall be hung in a manner to prevent a sharp bight or fouling when they are tightened.

(5) Guylines shall be fastened by means of shackles, hooks, or slides. The use of loops or molles for attaching guylines is prohibited.

(6) The "U" part of a shackle shall be around the guyline and the pin passed through the eye of the guyline. Pins shall be secured with cotterkeys, or the equivalent.

(7) All spliced guyline eyes shall be tucked at least three times.

(8) Extensions to guylines shall be equal in strength to the guyline to which they are

attached. Extensions shall be attached only by a regular long splice, a shackle connecting two spliced eyes, or double-end hooks, the fittings shall have at least one and one-half times the strength of the guyline.

(9) Guylines shall be used with any logging equipment when required by the equipment manufacturer.

(10) Guying shall not be less than the minimum recommended by the equipment manufacturer.

(11) When guylines are used, all logging equipment shall be guyed and anchored in a manner capable of withstanding all resultant combined stresses.

(12) When side blocking or lateral yarding, lateral stability to yarders and tail trees shall be insured by guylines sufficient in number, breaking strength and spacing.

(13) All trees that interfere with proper alignment, placement or tightening of guylines shall be felled.

D. ANCHORING GUYLINES

(1) Stumps used for anchoring guylines and skylines shall be carefully chosen as to position, height, and strength. The guy anchors shall have a greater safety factor than the load imposed.

(2) Stumps shall be adequately notched and barked where attachments are to be made.

(3) Stump anchors shall be notched to a depth not greater than 1-1/2 times the diameter

of the line to be attached.

(4) Workers shall not stand close to the stump, or in the bight of lines as the guyline wraps are being tightened.

(5) When straps are used for guyline anchors, the straps shall have 1-1/2 wraps on the stump and both eyes shall be attached to the guyline.

(6) Standing trees shall not be used for yarder guyline anchors.

(7) Any logging machinery using a haul-back line larger than 7/8 inch shall not use standing trees for tail-hold or corner block anchors.

(8) Stumps, trees, and man-made anchors shall be inspected from time to time while the operation is in progress and insecure or hazardous condition immediately corrected.

E. BLOCKS AND TREE JACKS

(1) Blocks shall not be used for heavier strains or lines than those for which they were constructed.

(2) Sheaves and bearings shall be of a material and type that will safely withstand the speeds and strains imposed. Bearings shall be kept well lubricated.

(3) All blocks shall be fitted with line guards, or shall be designed or used in a manner that prevents fouling.

(4) Pins shall be securely fastened so that they cannot be accidentally knocked out.

(5) Bearing and yoke pins of all blocks shall be securely fastened.

(6) Excessively worn sheaves shall not be used.

(7) Mainline blocks used for yarding, swinging, loading, and unloading shall be of the type and construction customarily used for this purpose, and shall be bolted with not less than two bolts through the shells below the sheaves in a manner that will retain the sheave and line in case of bearing pin failure.

(8) Mainline blocks for yarding or swinging shall have a sheave diameter of not less than 16 times the diameter of the mainline.

F. HANGING OF BLOCKS

(1) All blocks used to hold lines directly to yarders, loading or unloading machines shall be hung in both eyes of straps. Threaded straps for such use are prohibited.

(2) Tail, side, or corner blocks used in yarding shall be hung in both eyes of straps.

(3) On all logging systems, sufficient corner or tail blocks shall be used to distribute the stress on anchors and attachments.

(4) The yoke-pin of haulback blocks shall be inserted with the head facing in the direction from which the butt rigging approaches.

(5) All other blocks shall be properly and securely hung in straps or other means which will furnish equivalent security.

G. PASS LINES AND CHAINS

(1) All tail trees shall be equipped with pass lines if climbing is required.

(2) Pass lines shall:

(a) Not be less than 5/16 inch and not be over 1/2 inch in diameter;

(b) Not be subjected to any sawing on other lines or rigging and kept clear of all moving lines and rigging;

(c) Be of one continuous length and in good condition with no splices, knots, molles, or eye-to-eye splices between the ends.

H. PASS BLOCKS

(1) Pass blocks shall:

(a) Be inspected and repaired if necessary before being used;

(b) Have the shells bolted under the sheaves;

(c) Have the bearing pin securely locked and the nuts keyed or the block be of a type which positively secures the nut and pin;

(d) Equipped with sheaves not less than 4 inches in diameter; and

(e) Not be used for any other purpose. They shall be identified by special colored paint or other equally effective means.

I. STRAPS

(1) All tree straps shall be the right size to give a strength equal to twice that of the pulling lines they support. (Straps 1/8 inch larger than a pulling line will be assumed to be in reason-

able compliance with the requirement when the block is hung in both eyes.)

(2) All tree straps shall be of new or undamaged wire rope when made up. They shall be replaced when there is evidence or damage or broken wires.

(3) The use of shackles instead of eyes for attachments on tree straps is recommended.

(4) All straps, other than tree straps, shall have a strength at least equal to the strength of the lines or rigging they support.

(5) Main line lead straps shall be hung and maintained not more than 10 inches below the guylines at the back side of the tree opposite the block.

(6) Haulback blocks shall be hung as close as possible to intermediate supports.

(7) Straps that are used to hang blocks or rigging in a single eye shall be of a size and condition to render a strength equal to two times the stress imposed on the line with which they are used. Sleeve type shackles shall be used where choked straps are permitted.

(8) Safety straps shall be used on all yarding or swing mainline lead blocks, or skyline blocks.

(9) Safety straps shall be of not less than 1/4 inch larger than the line it supports with one end securely fastened to the shell of the block and the other end to a sleeve type shackle arranged to slide on the guyline.

(10) Pins or shackles used on safety straps shall be secured with a cotterkey.

(11) Crotch-line straps for loading hooks or end bridles shall be of the length or adjustable to the length necessary to give the proper end pull and shall be made of not less than 5/8 inch line. The size of this line shall be increased in accordance with the weight of the logs being handled.

J. SKYLINES

(1) Stationary skylines shall be hung in a tree jack, and shall be securely anchored to a stump or a deadman. The end of the skyline shall not be anchored to a tail tree.

(2) Skylines shall be anchored by choking one stump and using a large shackle over the skyline with the pin through the eye. Skylines anchored to deadmen shall be passed through a block and properly clamped or shackled to the straps.

(3) Extentions to skylines shall be equal in strength to the skyline to which they are attached. Extensions shall be attached only by a regular long splice, wedged coupling, or a shackle connecting two spliced eyes, tucked at least three times. If connected by a shackle, the shackle shall have at least one and one-half the strength of the line.

K. SHACKLES

(1) All shackles used to hang blocks, jacks, or rigging on trees or loading booms shall have the pins fastened by a nut or secured with a cotterkey or locks.

(2) Shackles used to hang blocks, jacks, or other rigging that may be subjected to potential stress greater than that imposed by a single part of the pulling line with which they are to be used shall have a strength equal to not less than two times the stress imposed by the pulling line.

(3) The minimum sizes of shackles required to hang or attach single sheave blocks or jacks shall be not less than those shown in the following table, and shackles shall be of an alloy which develops 120,000 PSI ultimate tensile strength or better.

Wire Rope Size	Shackle Size	Wire Rope Size	Shackle Size
1/2″	3/4″	7/8″	1-1/4″
9/16″	13/16″	1″	1-3/8″
5/8″	7/8″	1-1/8″	1-1/2″
3/4″	1-1/8″	1-1/4″	1-3/4″

(4) All shackles used for joining or attaching lines shall have a strength of not less than one and one-half times that of a type designed for the purpose.

(5) The minimum sizes of shackles required for joining or attaching lines shall be not less than those shown in the following tables:

Wire Rope Size	Shackle size if not less than 70,000 PSI ULT. tensile strength	Shackle size if not less than 120,000 PSI ULT. tensile strength
1/2"	7/8"	5/8"
9/16"	15/16"	11/16"
5/8"	1-1/8"	7/8"
3/4"	1-1/4"	1"
7/8"	1-3/8"	1-1/8"
1"	1-3/4"	1-1/4"
1-1/8"	1-7/8"	1-3/8"
1-1/4"	2"	1-1/2"

NOTE: The manufacturer's rated breaking strength of the shackles may be used in determining oversize requirements when the shackle in question can be identified as to its make, size, and steel classification.

(6) The size of the opening between the jaws of shackles used to hang blocks, jacks, rigging, or joining, or attaching lines, shall not be more than one inch greater than the size of the rope, swivel, shackle, or similar device to which it is attached.

(7) Shackle pins and nuts shall be replaced when worn or when threads are worn or stripped.

L. UPBUILDING BY WELDING

(1) The upbuilding by welding of high lead shackles or skyline shackles is prohibited.

(2) Shackles, swivels, links, and rigging plates shall be replaced or repaired when they are worn so that they will safely support the imposed strain.

(3) Shackles and swivels subjected to heavy strains shall not be built up by welding after they have become worn beyond the point of safety.

M. WIRE ROPE

(1) All wire rope offered for sale shall be certified as to its breaking strength by the manufacturer or vender in accordance with the U.S. Bureau of Standard's specifications, or other acceptable authority before being used for any hazardous purpose.

(2) Wire rope which is badly worn, crystallized, or kinked shall not be used.

(3) Stranded, chafed, or sawed wire rope shall be replaced or repaired upon discovery.

(4) Wire rope that has been burned shall be discarded.

(5) Wire rope worn or damaged beyond the point of safety shall be taken out of service or properly repaired before further use.

(6) Under ordinary circumstances, a wire rope including standing lines shall not be used when twelve and one-half percent (12½%) of the wires are broken within a distance of one wrap (lay).

(7) Wire rope which is corroded, damaged or has improperly applied end connections shall not be used.

(8) Wire rope which has been subjected to a strain greater than 67 per cent of its breaking strength (two times the safe working load) shall be used only in applications for which the next smallest strength line would be required.

(9) The use of hard hammers for cutting cable with a wire axe is prohibited.

(10) A cable cutting, soft hammer and wire axe, or cutting torch shall be available and shall be used for cutting cables.

(11) Wire rope shall:

(a) Be kept lubricated as conditions of use require;

(b) Be of the same size and construction and the same or better grade as originally furnished by the equipment manufacturer unless otherwise recommended by the manufacturer.

(c) Be taken out of service when any of the following conditions exist:

(1) In running ropes, 6 randomly distributed broken wires in one lay or 3 broken wires in one strand in one lay;

(2) Wear of 1/3 the original diameter of outside individual wires;

(3) Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;

(4) Evidence of any heat damage from any cause;

(5) Reductions from nominal diameters as follows:

(a) 1/64 inch for diameters 3/8

inch to and including 5/16 inch;
(b) 1/32 inch for diameters 3/8 inch to and including 1/2 inch;
(c) 3/64 inch for diameters 9/16 inch to and including 3/4 inch;
(d) 1/16 inch for diameters 7/8 inch to 1-1/8 inch inclusive;
(e) 3/32 inch for diameters 1-1/4 inch to 1-1/2 inch inclusive.

N. END FASTENINGS AND SPLICING

(1) Short splices, eye to eye splices, cat's paws, knots, molles and rolled eyes are prohibited except for temporary purposes.

(2) Knots will be permitted for use with single drum skidders and crawlers and grapple pick-up lines when properly tied. Knots on the straw line will be permitted.

(3) That portion of the cable used for hoisting, and the next three full wraps on the drum, shall be free of splices.

(4) Eye splices in all "regular lay" lines and straps shall be tucked at least three times

(5) All line eye splices shall be tucked at least three full tucks. D's and knobs are recommended for line ends.

(6) Splices other than eye splices in "lang lay" loading lines are prohibited. Eye splices in "lang lay" lines shall be tucked at least four times.

(7) Long splices shall be used for permanently joining "regular lay" running lines. The

safe margin of line to be used in making a long splice is indicated in the following table. The full length of the splice will be twice that "to be unraveled".

Rope Diameter	To Be Unraveled	Rope Diameter	To Be Unraveled
1/4 inch	5 feet	1 inch	12 feet
1/2 inch	7 feet	1-1/4 inch	15 feet
3/4 inch	9 feet		

(8) The strand-ends of spliced cables shall be properly trimmed.

(9) Soft hammers, marlin spikes, or needles in good condition, and large enough for the size of the line being spliced shall be used.

(10) The manufacturers' recommendations shall be followed in attaching sockets and similar end fastenings.

(11) Other means of attachment of end fastenings may be acceptable when approved by the Division.

(12) The rated efficiency of the various types of end fastenings shall be as follows:

End of Fastening	Will Develop (approximately)
Clamps properly attached	80% to 85% of rope strength
Clamps improperly attached	Less than 50% of rope strength
Spliced eye and thimble	3/8" to 5/8" inc.— 95% of rope strength

Spliced eye and thimble	3/4" to 1-1/8" inc.—85% of rope strength
Spliced eye and thimble	1-1/4" to 1-1/2" inc.—80% of rope strength
Spliced eye and thimble	1-5/8" up—75% of rope strength
Spliced eye without thimble	Indeterminate because of flattening of strands under strain
Wedge sockets	65% of rope strength
Sockets properly attached	100% of rope strength

(13) The following table gives the strength efficiency which will be allowed for the ropes bent around sheaves of a given diameter as compared with the strength of the same rope when straight. (Based on U.S. Bureau of Standards' Tests.)

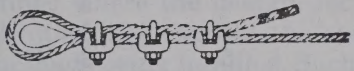
When Sheave Diameter Is	Efficiency of Rope
10 times rope diameter	79% of strength of straight rope
12 times rope diameter	81% of strength of straight rope
14 times rope diameter	86% of strength of straight rope
16 times rope diameter	88% of strength of straight rope
18 times rope diameter	90% of strength of straight rope
20 times rope diameter	91% of strength of straight rope

24 times rope diameter	93% of strength of straight rope
30 times rope diameter	95% of strength of straight rope

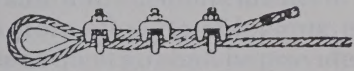
The above table is not intended to apply to sheaves, rolls, fairleads, etc., used as line guides where loading or angle of line departure contact only a small per cent of the sheave.

O. APPLICATION OF WIRE ROPE U-BOLT CLIPS (CROSBY TYPE)

(1) Wire rope U-bolt clips shall be used according to the correct method illustrated below:



(a) CORRECT METHOD — U-Bolts of clips on short end of rope. (No distortion on live end of rope.)



(b) WRONG METHOD — U-Bolts on live end of rope. (This will cause mashed spots on live end of rope.)

(c) WRONG METHOD — Staggered clips; two correct and one wrong. (This will cause a mashed spot in live end of rope due to wrong position of center clip.)

(d) After rope is in service and is under tension, tighten clips to take up decrease in rope diameter.

(2) The number and spacing of U-bolt wire bolt clips shall comply with the following table:

Rope Diameter Inches	Drop Forged Clips	Clips of Other Material	Minimum Spacing In Inches
1/2 & less	3	4	3
5/8	3	4	3-3/4
3/4	4	5	4-1/2
7/8	4	5	5-1/4
1	5	6	6
1-1/8	6	6	6-3/4
1-1/4	6	7	7-1/2
1-3/8	7	7	8-1/4
1-1/2	7	8	9

SECTION 4.
LOGGING MACHINES

A. GENERAL REQUIREMENTS

(1) Sheds or roofs and necessary screens or barriers of sufficient strength and dimension to afford adequate protection for the operator shall be provided on or over all logging machines. Such devices shall be constructed so that they do not impair the operator's view or restrict egress in case of emergency.

(2) Substantial barriers or bulkheads to protect the operator shall be provided on all logging machines where the design, location, or use of such machines exposes the operator to materials or loads being handled. Such barriers or bulkheads shall be of adequate area and capable of withstanding impact of materials handled.

(3) A safe and adequate means of access to and egress from all parts of logging machines where persons must go shall be provided. Necessary ladders, steps, step plates, foot plates, running boards, walkways, grab irons, handrails, etc., shall be provided and maintained.

(4) Controls shall be maintained in good operating condition.

(5) Exhaust pipes shall be so located or guarded that workers will not be endangered by accidental contact with them.

(6) Exhaust pipes shall be located or designed to direct exhaust gases away from the operator.

(7) Brakes shall be installed on all machine drums and maintained in effective working condition.

(8) Brake lining shall be of material designed for this purpose.

(9) Brake levers shall be provided with a ratchet or other equally effective means for securely holding the drums.

(10) Brakes shall be protected from direct exposure to the elements, or shall be of a design or construction which will render them impervious to such exposure. Operators shall test brakes before taking full load at the start of each shift.

(11) Logging machines shall be kept free of flammable waste material and any loose material which might contribute to slipping, tripping, or falling to the extent possible.

(12) Logging machine engines shall be stopped during fueling, inspection, or repairing except where operation is required for adjustment.

(13) While yarding, line machines shall be stabilized to prevent movement.

(14) Fairleads shall be properly aligned at all times and shall be of a design that will prevent line damage.

(15) A guide pulley, tool, stick, iron bar or other mechanical or manual means shall be used when guiding lines onto drums. Guiding lines onto drums with any part of the body in direct contact with the line is prohibited.

(16) Ends of lines attached to drums on

logging machines shall be secured by end attachments with not less than three wraps on the drums. (This does not apply to crawlers or skidders.)

(17) To protect against workers being exposed to the hazardous pinchpoint area between the rotating superstructures and the nonrotating undercarriage of any logging machine:

(a) Signs shall be conspicuously posted on all sides of any logging machine warning workers: DANGER — STAY CLEAR;

(b) Items of personal property, tools, or other miscellaneous materials shall not be stored on or near any logging machine.

(18) Speed limiting devices, safety stops or emergency shut down devices, or shut off valves, shall be provided with the controls so located that in the event of an emergency, the prime mover may be shut down from a safe place.

(19) Workers shall approach the hazardous pinchpoint area only after informing the operator of his intent and receiving acknowledgement from the operator that the operator understands his intention. All logging machines shall be stopped while any worker is in the hazardous pinchpoint area.

(20) When the nature of the work requires a person to work within three feet of the swing radius of the rotating superstructure, a warning barricade shall be provided. This requirement shall not apply to logging machines when:

(a) The distance from the highest point of

the undercarriage to the lowest point of the rotating superstructure is greater than 18 inches. This applies only to that portion of the rotating superstructure that swings directly over the undercarriage.

(b) The distance from the ground to the lowest point of the rotating superstructure is greater than 6 feet 6 inches. This applies only to that portion of the rotating superstructure that swings directly over the undercarriage.

(c) On crawler-type track-mounted logging machines the rotating superstructure is positioned at a right angle to the tracks, and the distance from the side of the cab to the extreme end of the track is four feet or less.

(21) Logging machine blades or similar attachments shall be lowered to the ground when machines are not operating or when the operator leaves the operating position.

(22) Logging machines shall not be moved until all workers are in the clear.

(23) Riding on arches, reaches, turns of logs, or any part of a machine except on the driver's seat is prohibited except where a seat under the canopy guard is provided.

(24) Crawlers, skidders, arches, or logs shall not run over or rub against guy lines, anchors or other rigging.

B. MOBILE YARDERS AND LOADERS

(1) All mobile yarders and loaders shall be designed and constructed with sufficient strength to withstand the expected strains to be

imposed on them without the resulting stresses exceeding the allowable working stresses of the materials used in their construction.

(2) In no case shall the allowable stresses permitted be more than one-half of the yield strength of the material.

(3) Conversion of cranes, shovels, etc., into yarders or loaders shall be made in conformity with these rules.

(a) Necessary guylines or outriggers shall be provided and used to effectively prevent masts, booms, A-frames, etc., from tipping or overturning.

C. A-FRAMES, TOWERS AND MASTS

(1) The design, erection and use of A-frames, towers, or masts shall conform to the pertinent requirements of the safety codes applicable to their intended use.

(2) A-frames, towers and masts shall be of a design and construction to provide adequate structural strength and sufficient vertical clearance or height for positive control of materials or loads.

(3) A-frames, towers and masts shall be adequately guyed or braced to provide stability and prevent tipping.

(4) The base of A-frames and similar devices shall be secured against possible displacement and the top shall be securely bolted or lashed to prevent displacement.

(5) Tail trees, A-frames or similar devices used as booms shall be provided with topping

lines, hold-up lines, sailguys, or pendants necessary to conform to the requirements for safety factors for rigging. Attachment for such rigging shall conform to the requirements for straps, shackles, and similar rigging (see Section 3).

(6) All rigging on mobile A-frames, towers, masts, or similar devices must be inspected, and worn or defective parts replaced or repaired before they are raised or used on each respective setting.

(7) Where guylines are used, such guylines shall be installed in conformity with the requirements for guylines contained in this code.

D. MOVING MACHINES

(1) When snubbing machines down steep grades, the mainline shall be used for snubbing and the haulback for pulls. Sufficient snubbing rigging shall be set for safety.

(2) Only the operator and those required to assist the operator shall ride on the machine while it is being moved. A clear way of escape for such persons shall be provided. Workers shall stand outside of the bight and well in the clear of fairlead, or other rigging while pulls are being made.

(3) Leaning the machine heavily toward the operator while moving shall be avoided. Care shall be taken not to bump any part of the machine against snags in passing.

(4) When moving logging machines, the drivers or operator shall have a clear and un-

obstructed view in the direction of travel. When this is not possible, and:

(a) When moving to areas outside of the landing area, a signalman with a clear and unobstructed view of the direction of travel shall direct the movement of the machine; or

(b) When moving to areas within the immediate landing area, all persons working on the landing shall stay clear of the machine or shall inform the operator of his intentions to approach or be near the machine.

(5) Where a signalman is used, the equipment operator shall move the equipment only on signal from the designated signalman and only when the signal is distinct and clearly understood.

(6) Logging machines that depend on engine rpms for steering and braking shall be fitted with an auxiliary device to insure braking capabilities.

(7) Crawler crane-type logging machines shall not travel on road grades greater than 20 per cent unless they are securely snubbed or towed.

(8) A traction lock or brake shall be provided on crawler crane-type machines capable of holding the machine stationary under normal working conditions, and on any grade the machine is capable of negotiating. Manufacturers shall specify the type of holding means provided.

(9) Service brakes on crawler crane-type logging machines shall be adequate to bring the

machine to a stop from normal travel speeds. Means shall be provided to adequately hold the machine stationary while working on any grade which it can negotiate.

E. STATIONARY AND MOBILE EQUIPMENT OPERATION

(1) Equipment operators shall follow the manufacturer's and employers' recommendations for equipment operation, maintenance, safe practices, and site operating procedures.

(2) Equipment shall be kept free of flammable material as much as practicable.

(3) Equipment shall be kept free of any loose material which might contribute to slipping and falling.

(4) Engines shall be shut down during fueling, servicing, and repairs except where operation is required for adjustment.

(5) Equipment shall be periodically inspected for evidence of failure or incipient failure.

(6) The equipment operator shall walk completely around the machine and assure that no obstacles or personnel are in the area before startup.

(7) The equipment operator shall start and operate equipment only from the operator's station or from a safe area recommended by the manufacturer.

(8) Seat belts shall be provided on mobile equipment.

(9) The equipment operator shall check all controls for proper function and response before using them.

(10) The equipment operator shall ground or secure all moveable elements when not in use.

(11) The equipment operator shall maintain adequate distance from other equipment and personnel.

(12) Where signalmen are used, the equipment operator shall operate the equipment only on signal from the designated signalman and only when signal is distinct and clearly understood.

F. CRAWLERS AND SKIDDERS

(1) Every skidder, front-end loader, and fork-lift truck used in logging operations and related activities shall be equipped with a roll-over protection system (ROPS) and seat belts for the protection of the operator. The ROPS shall be of sufficient width and height so that it will not impair the movements of the operator or prevent the operator's immediate escape from the skidder in emergencies. It shall allow the operator all visibility possible. Seat belt buckles shall be of the quick release type.

(2) ROPS on all equipment purchased after January 1, 1981, must meet all standard manufacturers' safety specifications.

(3) Skidders shall be started and operated only by authorized personnel.

(4) Skidder operators shall not be permitted to work alone where they are not in fre-

quent contact throughout the day with some person who could assist them in case of an accident.

(5) The general operating condition of a skidder shall insure the safety of the driver and other workers.

(6) All guards shall be kept in place and in good repair when the skidder is in use.

(7) Operating a skidder with defective steering devices is strictly prohibited.

(8) A skidder shall not be operated on terrain on which it cannot be adequately controlled.

(9) Skidders must have an adequate locking device which will hold the machinery stationary. Skidders shall not be left standing without first setting this locking device.

(10) Blades or similar equipment shall be lowered to the ground when skidders are not operating or are left unattended.

(11) When skidding, skidders operate around other workers and therefore all movements shall be regulated by standard signals. Skidders shall not be moved until all persons are in the clear.

(12) No person shall go near or under a skidder without the operator first immobilizing it.

(13) A worker shall not stand on any part of a skidder or arch unless he is required to do so by the nature of the work.

(14) Engines must be shut off while repairs or adjustments to clutches, frictions, or

other parts of the skidder are being made.

(15) Riding on arches, reaches, turns of logs, or any part of a skidder except in the driver's seat is prohibited, except where a seat under the canopy guard is provided.

(16) In skidder operations, workers shall at all times watch for and protect themselves from side-winders, rolling or upending logs and lines.

(17) Chokers shall be placed near the end of the log when skidder is yarding.

(18) Skidders, arches, or logs shall not be permitted to run over or rub against anchored lines, tailhold stumps, or other rigging.

(19) Logs shall not be swung over the skidder by a loading machine.

(20) Arches shall be equipped with line guards.

SECTION 5.
LOG LOADING

A. GENERAL REQUIREMENTS

(1) Loading operators shall have a clear view of the landing and of the trucks being loaded.

(2) Truck drivers or others may remain in the cab of the logging truck while logs are being loaded, when outside they are not allowed to leave the area immediately adjacent to the truck cab.

(3) No person shall ride loads while cars are being spotted or dropped, except those whose regular duties require them to do so.

(4) While logs are being loaded, no one shall remain on the load, chain dock or behind the cab protector. Any unattached material shall be removed from the top of the cab protector before truck is moved from the landing.

(5) Logs shall not be swung over occupied equipment by loading machine on landings.

(6) When trucks are loaded by use of a log stacker and the lay of any log is higher than the stakes, the log stacker shall remain against the completed load or other suitable protection shall be provided to prevent the logs from falling until two binders have been applied.

(7) All limbs or knots projecting beyond stakes shall be removed before truck or car leaves the landing.

(8) To control the movement of a log truck being loaded, a positive means of communication shall be established between the truck driver and the loading operator.

(9) Unnecessary talking to an operator is prohibited while the operator is engaged in handling controls.

B. BOOMS AND LOADING EQUIPMENT

(1) The loading boom must be in good repair, with cross rods and braces, eye bolts and heel blocks well secured. It must be kept free of all loose straps, chains, etc. Loading blocks shall be of sufficient weight to pull the slack for the grapple line without adding extra weight. The swing line on the loading boom shall have sufficient clearance above log pile, truck, or skidder (if used) in order not to endanger crew while loading trucks or cars at landing.

(2) Where grapples, or similar device is used for loading, the log holding device shall be lowered to the ground whenever the machine is unattended.

(3) It is recommended that the equipment be of such design as to lower the boom with power.

(4) Booms not having power down shall be dogged before workers enter the hazardous area around the boom.

(5) All heel booms, shovels and long booms used for loading, unloading, or skidding logs shall be equipped with outriggers which

shall be extended when loading, unloading, or skidding. (Not to include crawler type.)

(6) Heel hold-up strap must be securely fastened and of sufficient strength to withstand imposed load.

(7) A positive boom stop shall be installed on all machines equipped with a boom which can raise to a position where it could endanger the operator or other persons.

(8) Workers shall not be under any boom while it is being held by the brake.

(9) Loading machines shall be equipped with an effective parking brake system which is not dependent on the aid of hydraulic pressure which is used to stop the machine while traveling.

(10) A braking system shall be installed on the load line and boom supporting equipment which shall be capable of stopping and holding, in any position, the maximum load for which the loading machine is designed.

(11) Defective outriggers shall be repaired or replaced immediately.

(12) A stable base shall be provided under outriggers or leveling pads.

(13) Defective hydraulic hoses, lines, and fittings shall be replaced.

(14) Hydraulic cylinders on knuckle booms, lifting and lowering cylinders on hydraulic booms, tilt and clamp on front end loaders, and hydraulic outriggers shall have a positive holding device (load check valve or a manually operated valve) to prevent movement

of the piston in the event of a hose or fitting failure.

(15) The use of plain spiked loading hooks without a bell is prohibited for loading logs.

(16) Loading machines shall be set so that the operator shall have an unobstructed view of the loading area, or a signalman shall be properly placed and his signals shall be followed.

(17) All boom type equipment used for handling logs shall be equipped with guards to protect the operator and controls.

(18) A minimum of 30 inches shall be maintained between the counter weight of a loading machine and trees, logs, banks, trucks, etc., while the machine is actively engaged in motion. If this clearance cannot be maintained, suitable barricades or safeguards shall be installed to isolate the hazardous area.

(19) Fork-lift loaders and stackers shall be provided with overhead guards.

(20) Fork-lift loaders which have lift arms that create a shear point with the driver's cab or position shall be provided with shear guards which will eliminate such exposure.

(21) Grapple arms or other positive means of keeping logs on the forks shall be required on fork-lift type loading machines.

(22) Crotch-line straps for loading hooks or end bridles shall be of the proper length or adjustable to the length necessary to give the proper end pull and shall be made of not less than 1/2 inch line. The size of this line shall be increased in accordance with the weight of the logs being handled.

C. CROSS-HAUL SYSTEMS

(1) In cross-haul (parbuckle) or roll-on loading systems the skid timbers shall be of sufficient strength to support the logs being loaded. These timbers shall be of sufficient length to remain in place while the log is being loaded.

(2) Loaders on this system shall work at the ends of the logs being loaded.

D. RELOADS AND TRANSFERS

(1) Reloading and transfers shall be subject to the provisions of these rules.

E. TONGS

(1) Tongs shall be maintained in a good condition and carried in a safe manner.

(2) Tongs may be used on logs provided the logs are barked and notched to insure a secure hold.

F. LOADING TRUCKS

(1) The method of loading shall be such that the outer logs in any tier or layer unsecured by stakes, shall have their centers inside of the centers of the outer logs of the next lower tier or layer so that the load is stable without the aid of a wrapper.

(2) Logs shall be well saddled without crowding so that there will be no excessive strain on the wrappers, bunk chains, or stakes.

(3) Bunk logs on motor trucks with compensating reach type trailers shall extend not

less than 12 inches beyond the bunks, or a positive means shall be used to prevent the logs from slipping off the bunks.

(4) Not more than the upper half of any log shall extend above stakes unless properly and securely saddled.

(5) When logs are to be unloaded at different destinations, vehicles shall not be moved after each partial unloading until the requirements for binders and loading are met.

(6) In loading logs care shall be taken to properly balance the load on the center plates of the car or truck and trailer.

(7) Logs on motor trucks shall be loaded so that not more than one-third of the weight of the logs extends beyond the trailer bunks.

(8) Logs shall be loaded so that not more than one-third of the weight of any log shall extend beyond the end of the logs supporting it.

(9) All workers shall be in the clear while logs are being hoisted or while logs or loads are being shifted on or swung toward cars or trucks.

(10) Standing directly between a truck cab and a log being loaded or unloaded is prohibited.

(11) Truck cabs shall be kept in the clear of swinging logs or loads.

(12) Logs shall not be lowered to the bunk while bunk or stake adjustments are being made or until the person making these adjustments is in the clear.

(13) Loads or logs shall not be moved or shifted while binders are being applied or ad-

justed. Binders shall be placed and tightened around the completed load before shifting it for balance. Sufficient binders to hold the load shall be placed and tightened before a truck is moved from the landing.

SECTION 6.
LANDING

A. GENERAL REQUIREMENTS

(1) Landings shall be prepared and arranged to provide maximum safety for all employees and shall provide ample space for the safe movement of equipment and storage and handling of logs.

(2) All log landing areas shall be adequately chunked out and as level as reasonably possible.

(3) Adequate means shall be installed to prevent logs from rolling into the road or against equipment.

(4) Logs shall not be landed at loading areas until all workers, skidders, trucks, or equipment are in the clear.

(5) All persons shall stay in the clear of running lines, moving rigging, and loads, until rigging or loads have stopped.

(6) Logs shall not be swung or suspended over workers.

(7) Riding on logs suspended in the air or being moved is prohibited.

(8) Inexperienced hook tenders shall work under the close supervision of experienced persons.

(9) Workers shall be sure that logs are securely landed before approaching them.

(10) Workers shall choose the safest position before unhooking chokers, which is usually the upper side of the log.

(11) If there is a chance that logs will slide, they will be secured before the main line tension is released.

(12) Chokers are not to be unhooked until the log deck is secured.

SECTION 7.
FLAMMABLE AND COMBUSTIBLE LIQUIDS

A. GENERAL REQUIREMENTS

(1) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

(2) Approved metal safety cans shall be used for the handling and use of flammable liquids in quantities greater than one gallon.

(3) The dispensing units shall be protected against collision damage.

(4) Flammable or combustible liquids shall be drawn from or transferred into vessels, containers, or tanks only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container or portable tanks by gravity or pump, by an approved self-closing valve. Transferring by pressure on the container or portable tanks is prohibited.

(5) Flammable liquids shall be kept in closed containers when not actually in use.

(6) Storage areas shall be kept free of unnecessary weeds, debris, and other combustible material.

(7) At least one portable fire extinguisher having a rating of not less than 20 B-C units shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids.

(8) Areas in which flammable or combustible liquids are transferred at one time, in quantities greater than five (5) gallons from one tank or container to another tank or container, shall be separated from other operations by a twenty-five (25) foot distance.

(9) Drainage or other means shall be provided to control spills.

(10) Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.

(11) Except in areas of controlled slash burning, flammable liquids may be used only where there are no open flames or other sources of ignition within 50 feet of the operation, unless conditions warrant greater clearance.

(12) Motors of all equipment being fueled shall be shut off.

(13) Tank trucks shall comply with the requirements covered in the Standard for Tank Vehicles for Flammable and Combustible Liquids, NFPA No. 385

(14) There shall be no smoking or open flames in the areas used for fueling, servicing fuel systems for internal combustion engines, and the receiving or dispensing of flammable or combustible liquids.

(15) Conspicuous and legible signs prohibiting smoking shall be posted.

SECTION 8.
EXPLOSIVES

A. GENERAL REQUIREMENTS

The storage and transportation of explosives and blasting agents shall be in accordance with the Department of Treasury, Bureau of Alcohol, Tobacco and Firearms' Commerce in Explosives, Part 181 of the 27, CFR, in the most recent edition.

B. HANDLING

(1) All persons handling explosives shall use every precaution and safety measure possible, and shall be guided by the appropriate sections of the Alcohol, Tobacco and Firearms Code (cited above), and the instructions in or on the explosives containers.

(2) Caps shall never be carried in the pockets of a worker's clothing. Separate leather or canvas containers for powder and for caps shall be provided when it is necessary to carry explosives.

(3) Caps shall be issued only to experienced persons and only in amounts necessary for their immediate use.

(4) Whenever possible powder for immediate use shall be kept in the original containers and at a safe distance from workers and equipment.

(5) The supply of powder shall be kept to a minimum and shall be stored in a safe designated location.

(6) Explosives shall only be left in areas designated exclusively for explosive storage.

(7) Unused powder shall be returned each night to a locked magazine or powder box.

(8) No explosives shall be left on any job after its completion.

(9) Explosives shall be handled only by experienced persons or under their direct supervision.

(10) No person shall smoke while handling, storing, transporting, or working around explosives.

(11) Workers handling powder shall not:

(a) Use metal tools for opening powder boxes.

(b) Handle powder roughly.

(c) Store caps and powder together.

(d) Approach or enter holes where shots have been fired until sufficient time has elapsed for air to purify or the hole has been properly ventilated.

(e) Wear shoes with nails or metal plates in a magazine or in locations where they might cause sparks.

(12) Hazardous areas adjacent to blasting operations shall be cleared of personnel before blasting starts. Where necessary, flagmen shall be posted to insure that unauthorized personnel will not enter blasting areas.

(13) Care shall be taken to see that all persons are at a safe distance or under suitable cover before a shot is fired.

(14) If a fuse is used, explosions shall be

counted and compared with the number of charges lighted to insure against unknown "misfires" before work in the vicinity is resumed.

(15) Misfires shall be handled only by experienced and competent powder men in accordance with their best judgement and skill.

(16) The use of a fuse which is wet, oil-soaked, kinked or damaged in any way that might affect its burning rate is prohibited.

(17) The burning rate of safety fuses in use shall be tested, posted in conspicuous locations, and brought to the attention of all persons involved in blasting.

(18) In preparing primers the cap shall be firmly seated in the cartridge.

(19) Standard crimpers shall be used. Crimping with the teeth is prohibited.

(20) A fuse shall be cut off square for insertion in the cap, and the cap well crimped.

(21) The preparation of primers shall be done in a safe dry place, well away from fire or possible sparks.

(22) Cap containers shall be kept closed at all times except when caps are actually being removed.

(23) Damaged or deteriorated explosives and blasting agents shall be destroyed according to the instructions of the manufacturer or its agent. (Powder which has changed from normal color or condition [texture, size, shape, etc.] shall be considered deteriorated until its

exact condition has been determined by expert opinion.)

(24) The use of frozen explosives is prohibited. Thawing of frozen explosives by an artificial means such as open flame or exposed electrical heating elements is prohibited.

(25) All explosives not in use shall be removed from the blast area before firing.

C. WARNING SIGNAL

(1) A regular warning signal for blasting shall be established and posted and every person on the job shall be required to know the signal.

(2) Before blasting an adequate warning must be sounded in all directions and sufficient time allowed for all persons to reach a safe place.

SECTION 9.
MOTOR TRANSPORTATION

A. LOG HAULING

(1) The movement of motor trucks and railroad cars around landings and other places where persons are working shall be controlled by signals. Vehicles shall not be moved until all persons are in the clear.

(2) Where the operator's vision is impaired by the load or vehicle, the driver shall move only on a signal from a person with a clear view.

(3) When audible signals other than voice are used to control the movement of trucks at the landing or deck, the following audible signals shall be used:

1 SHORT ..... STOP OR AHEAD
2 SHORT ..... BACK
2 LONGS . . DANGER or HELP NEEDED

(4) Truck drivers or other workers shall not approach the dangerous area alongside trucks being loaded until communication has been established with the loading machine operator and the safe area.

(5) Truck decks shall be kept reasonably clean of debris.

(6) Projecting materials that impair clearance shall not be transported.

B. OFF HIGHWAY TRUCK TRANSPORT

(1) Truck drivers shall be required to stop their vehicles, dismount, check and tighten loose load binders, either just before or immediately after leaving a private road to enter the first public road they encounter.

C. SELF-LOADING LOG TRUCKS

(1) Self-loading log trucks manufactured after January 1, 1981, shall be equipped with:

(a) A load check valve (velocity fuse) or similar device installed on the main boom.

(b) A seat that is offset from the point of attachment of the boom. The seat and boom structure shall rotate concurrently.

(2) The operator of a self-loading log truck shall not:

(a) Heel the log over his head; or

(b) Heel the log on the operator side of the boom of the seat if offset from the point of attachment of the boom.

(3) A safe and adequate means of access to and from the loading work station on self-loading log trucks shall be provided.

(4) A self-loading log truck shall not load itself or another truck when the loading process is under or within a guyline circle or similar overhead hazard.

(5) Self-loading log truck operators shall not unload their own load unless positive means of securing the logs have been provided when binders are removed.

(6) Self-loading truck trailers shall be secured to the truck when the trailer is being hauled on the truck.

D. VEHICLE OPERATION

(1) A daily inspection shall be made of trucks and trailers with particular attention to steering apparatus, lights and reflectors, brakes, brake hoses and connections, boosters, reaches and couplings. Defects that render operations unsafe shall be corrected before use.

(2) Log truck drivers should have a general knowledge of the handling of logs in addition to being qualified log truck drivers.

(3) A brake test shall be made before starting with any load. Any defects shall be eliminated before proceeding.

(4) Engine-type brakes shall be considered as auxiliary controls, and shall not be used as a substitute for adequate braking systems.

(5) Vehicles shall not follow each other closer than 300 feet unless overtaking and passing.

(6) The operator of a vehicle shall not overtake and pass another vehicle unless the roadway ahead is clearly visible and is free of oncoming traffic for a sufficient distance to permit such overtaking and passing in a safe manner to all vehicles concerned.

(7) The operator of an overtaken vehicle shall, where possible, yield right-of-way on suitable audible signal and shall maintain a steady

speed if necessary until completely passed by the overtaking vehicle.

(8) Trucks shall not approach a landing while there is danger from incoming logs.

(9) Riding anywhere on a log truck except in the cab is prohibited.

E. TRUCKS

(1) Air or vacuum brake lines shall be of the type intended for such use and shall have fittings which will not be interchangeable with water or other lines.

(2) Safe working or treading surfaces on vehicles shall be provided. Such surfaces shall be of material and/or design to effectively minimize slippery conditions.

(3) Safe, non-slip platforms at least 18 inches wide and 48 inches long shall be installed on top of log truck cabs when loading methods require working on the load. A safe access to the top of the load shall be provided.

(4) Steps or an extension of the running boards shall be provided on both sides of the vehicles for easy access to the space behind the truck cab.

(5) A substantial bulkhead to protect the vehicle operator from moving or shifting loads shall be provided and it shall extend above the height of the cab.

(6) Tires worn beyond the point of safety shall not be used.

F. TRAILERS

(1) Substantial links, chains, or straps shall be fastened securely to the trailer frame and shall be used in hoisting the trailer. These connections shall be maintained in good condition and shall not be attached to the trailer bunk. They shall not be used for any other purpose.

(2) Trailers loaded on trucks shall be securely fastened or loaded in a manner which will prevent accidental unloading.

(3) In unloading trailers from motor trucks, trailers shall be hoisted clear, the truck driven a safe distance, and the trailer lowered to the ground level of the roadway before workers approach the trailer or reach.

G. BUNKS

(1) Every truck and trailer engaged in the transportation of logs loaded lengthwise shall be equipped with bunks and stakes.

(2) Stakes which release shall be constructed in such a manner that the releasing mechanism is activated from the opposite end of the bunk.

(3) The bunks or bolsters of any truck or trailer shall be either straight or curved upward.

(4) Bunks with ends lower than their centers shall not be permitted.

(5) Sufficient clearance shall be maintained to prevent bunk binding.

(6) Log bunks on trucks and trailers shall be sufficiently sharp to keep the logs from slipping longitudinally.

(7) Hooks or catches to hold excessive bunk chain slack shall be used as a safety measure on truck and trailer bunks.

(8) Bunk locks shall be installed on all trucks and trailers and shall be disengaged before starting with a load. (This does not apply to non-swiveling type bunks or automatic centering devices.)

H. BUNK STAKES

(1) All stakes, stake extensions, and bunks installed on log trucks and trailers, together with the means provided for securing and locking them in a hauling position, shall be designed and constructed of materials that will withstand operational stresses without yield or permanent damage.

(2) Stakes, stake extensions, bunks, or means provided for securing and locking them in hauling position shall be removed from service if found to be deformed or defective.

(3) Stakes and stake extensions shall be installed and maintained so that the angle between the bunks and them shall not exceed 90° when loaded.

(4) Stake extensions shall be secured to the stake to prevent accidental detachment, or removed from stake pockets when not in use.

I. BINDERS, WRAPPERS AND TIGHTENERS

(1) Binders shall be considered only as a precautionary measure to insure stability of loads. Loads shall be built up or loaded in a manner to be stable without the aid of binders.

(2) Binders shall be so arranged that they must be released from the side of the vehicle away from the brow log or dumping side in unloading.

(3) Binder chains or cables, fasteners or attachments thereof, used for any purpose as required by these rules, shall have a minimum breaking strength of not less than 15,000 pounds. NOTE: 3/8 inch "High Test" steel chain and 5/16 inch "Alloy" steel chain "Improved Plow Steel" wire rope of 6 x 19 and 6 x 37 construction, when in compliance with the requirements herein contained, will be acceptable.

(4) Binder chains or cables used for securing loads shall not be used for any other purpose.

(5) If chains are used as binders, they shall be of welded link construction and at least one link in every five feet of chain shall be stamped with the manufacturer's mark or symbol identifying the grade of chain. No chain shall be used that does not contain at least one link so stamped. (Means of identification other than the manufacturer's mark or symbol, if sufficiently individual and distinctive, may be acceptable.)

(6) Defective binder chains or cables, fasteners, or any attachments shall be immediately removed from use.

(7) Wrappers shall be removed from service when any of the following conditions exist:

(a) Excessively worn links on chains;

(b) Deformed or stretched chain links;

(c) Cracked chain links;

(d) Frayed, stranded, knotted or otherwise defective wire rope.

(8) Only chain links approved for welding (and properly welded) or approved repair links which will develop a strength equivalent to the chain are permissible for repairs or attachments for binder chains.

(9) Tying knots in binder cables is prohibited.

(10) Tighteners for securing chains shall be fitted with hooks of proper size and design for the chains with which they are used.

(11) Attaching grab hooks directly to binder cables is prohibited.

(12) Extension handles ("cheater pipes") for tightening or securing binders shall be limited to not over 36 inches in length.

(13) Extension handles ("cheater pipes") shall cover at least 10 inches of the binder handle.

(14) Warning shall be given before throwing binders over the load to prevent striking other persons.

(15) All binders shall be placed and tightened before a truck is moved. Wing logs which

do not exceed 12 inches or more beyond the stakes will not be considered secure.

(16) All loose ends of binder chains or cables shall be securely fastened so as to prevent their swinging free in a manner that will create a hazard.

(17) No log loaded on top or outside saddles of a load shall be transported unless secured by not less than two binder chains or cables, one of which shall be placed near each end of such log.

(18) Loads consisting of 5 logs or more shall be secured.

(19) Loads consisting of 7 or more logs less than 16 feet in length and loaded lengthwise shall be secured by two evenly spaced binder chains or cables.

(20) One binder on each truck shall be of a knockout type.

(21) At least three binders and wrappers shall be carried on each log truck.

J. SAFETY CHAINS

(1) All log truck and trailer combinations shall be equipped with safety chains or cables which shall be installed or replaced in compliance with the following requirements:

(a) Each log truck and trailer combination shall be equipped with one or more safety chains or cables which shall have a rated breaking strength of not less than the gross weight of the towed vehicle.

(b) Each log truck and independent trailer combination (mule train) shall be equipped with one or more safety chains or cables, which shall have a rated breaking strength of not less than the gross weight of the towed vehicle.

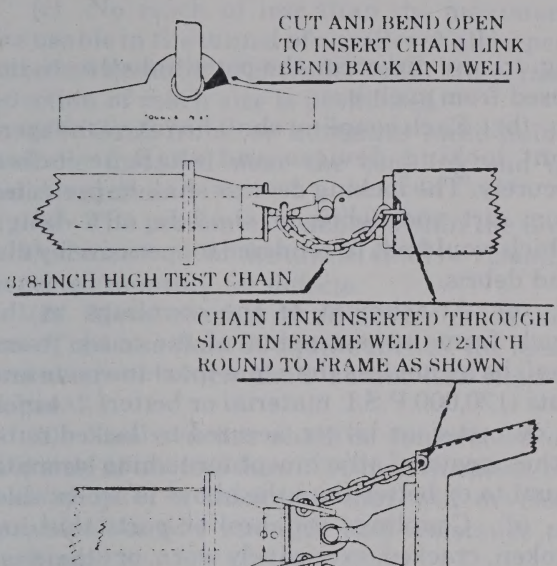
(c) Each safety chain or cable shall be permanently attached, if possible, to the truck frame or frame extension and shall attach within 12 inches of the eye of the reach.

(d) Each such safety chain or cable shall form a separate continuous connection between the truck frame, or extention of truck frame, and the reach. They shall be attached with the minimum amount of slack necessary to permit proper turning.

(e) Means of attachment for safety chains or cable shall provide strength equivalent to that rendered by the chain or cable. In addition, means of attaching and detaching of chains or cables from reach, truck frame, or extention of truck frame, shall be of a design to provide a positive connection that cannot be rendered inoperative by any condition of use or exposure. Butt welding of safety chain links to reach, truck frame, or extension of truck frame is prohibited.

(f) Safety chains or cables which contain cut, cracked, or excessively worn links or frayed, stranded, or otherwise defective wire rope shall be replaced immediately.

(2) Safety chains may be attached by one of the following methods:


CUT AND BEND OPEN
TO INSERT CHAIN LINK
BEND BACK AND WELD
3/8-INCH HIGH TEST CHAIN
CHAIN LINK INSERTED THROUGH
SLOT IN FRAME WELD 1/2-INCH
ROUND TO FRAME AS SHOWN
STEEL PLATE WELDED
TO REACH HEAD

K. COUPLINGS

(1) All log truck and trailer combinations shall be equipped with couplings of material, design, and construction, equal to or better than the following requirements or they shall be removed from service:

(a) Couplings (hitches) for log truck and trailer units shall be designed and constructed for such use and shall be capable of withstand-

ing, in any direction, the potential stresses imposed from such use.

(b) Each coupling shall have two independent locking devices and shall be locked securely. The locking devices shall be protected from dirt and debris or shall be of a design which would not be rendered inoperative by dirt and debris.

(c) Attachment of the couplings to the truck frame or extension of the truck frame shall be by not less than four machine bolts and nuts (120,000 P.S.I. material or better) 3/4 inch in diameter, or larger, secured by locked nuts. Other means of attachment furnishing strength equal to or better than the above is acceptable.

(d) Couplings (hitches) or parts that are broken, cracked, excessively worn, or otherwise defective shall be immediately removed from service.

L. REACHES

(1) All log truck and trailer combinations shall be equipped with reaches of material, design and construction, equal to or better than the requirements in the following rules or they shall be removed from service:

(a) The reaches of trailers being towed shall be provided with a one-inch pin near the end or an equally effective means to prevent pulling or stripping through the tunnel.

(b) Reach locks or tighteners shall be of the type that will securely lock the reach in the tunnel.

(c) No reach of less than the maximum size usable in the tunnel of a trailer shall be permitted. Alteration of a trailer tunnel to permit reduction of reach size is prohibited.

(d) Grab-irons or adequate hand-holds shall be installed near the coupling end of trailer reaches.

(e) The portion of reaches within the tunnel that insert out of the tunnel shall be visually inspected monthly for defects.

(2) Metal reaches shall have a cross section of not less than 60 square inches, the least dimension of which shall be not less than 6 inches.

(3) Steel reaches shall be constructed of mild steel of not less than 3/16 inch thickness or steel alloy of a thickness that will develop equivalent tensile strength and resistance to crushing.

(4) Reaches with bent, cracked, excessively worn, or otherwise defective parts shall be immediately removed from service.

M. LOGGING ROADS

(1) Logging roads shall be marked when used for logging operations and truck hauling, and also marked as to the C.B. channel in use at the entrance of the road.

(2) Logging roads shall be marked with mile post markers on each side of the post marker.

(3) Road grades shall be limited for safe operation by careful consideration of the following factors: type of material to be used as roadbed, surfacing, type of hauling equipment to be used, size of loads to be hauled, length of grades, width of road, weather conditions, degree of curvature and visibility.

(4) Truck roads shall be of sufficient width and evenness to insure the safe operation of equipment.

(5) Conditions such as broken planking, deep holes, large rocks, logs, etc., which prevent the safe operation of equipment shall be immediately corrected.

(6) Truck roads on blind curves where visibility is less than three hundred (300) feet shall be of sufficient width for two (2) trucks to pass, or some type of signal system maintained or speed limit of fifteen (15) miles per hour established.

(7) Sufficient turnouts shall be provided and a safe side clearance maintained along all truck roads.

(8) Wheel guard rails on bridges shall not be less than ten (10) inches high above deck, substantially fastened to withstand impact of shearing wheels. Such guard rails shall extend the full length of bridge.

N. ROAD SIGNS

(1) Standard-type warning signs bearing the wording "Log Trucks" shall be maintained on the right hand shoulder of public thorough-

fares at points approximately five hundred (500) feet in each direction from the entrance or exit of private logging roads that are in use. Type, design, and location of such signs shall conform to the requirements of the State Department of Highways, county, city, or other authority having jurisdiction over the public thoroughfare.

SECTION 10.
HELICOPTER LOGGING

A. GENERAL REQUIREMENTS

(1) Prior to each day's operation a briefing shall be conducted. This briefing shall set forth the daily plan of operation for the pilot and ground personnel.

(2) Personal protective equipment for employees receiving the load shall consist of complete eye protection and hard hats secured by chinstraps.

(3) Loose-fitting clothing likely to flap in the downwash, and perhaps be snagged on the hoist line, shall not be worn.

(4) When visibility is reduced by dust or other conditions, ground personnel shall keep clear of main and stabilizing rotors.

(5) No unauthorized person shall be allowed to approach within 50 feet of the helicopter when the rotor blades are turning.

(6) All employees approaching or leaving a helicopter with blades rotating shall remain in full view of the pilot and remain in a crouched position.

(7) Employees shall avoid the area from the cockpit or cabin rearward unless authorized by the helicopter operator to be there.

(8) Helicopter approach and departure zones shall be designated and no equipment or personnel will occupy these areas during helicopter arrival or departure.

(9) A take-off path from the log pickup point will be established and made known to all the workers in the area before the first turn of logs is moved.

(10) Helicopters shall not pass over areas where fallers are working.

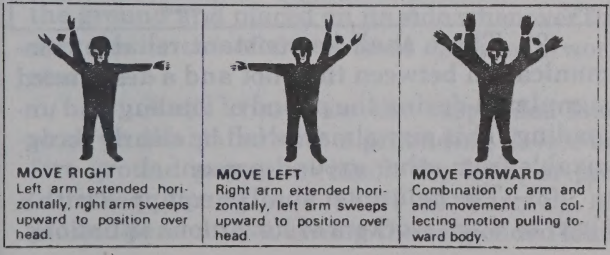
(11) Open fires shall not be permitted in an area that could result in such fires being spread by the rotor downwash.

(12) Helicopters shall be expected to comply with any applicable regulation of the Federal Aviation Administration.

(13) Every practical precaution shall be taken to provide for the protection of the employees from flying objects in the rotor downwash. All loose gear within 100 feet of the area of lifting the load, depositing the load, and all other areas susceptible to rotor downwash shall be secured or removed.

B. SIGNAL SYSTEMS

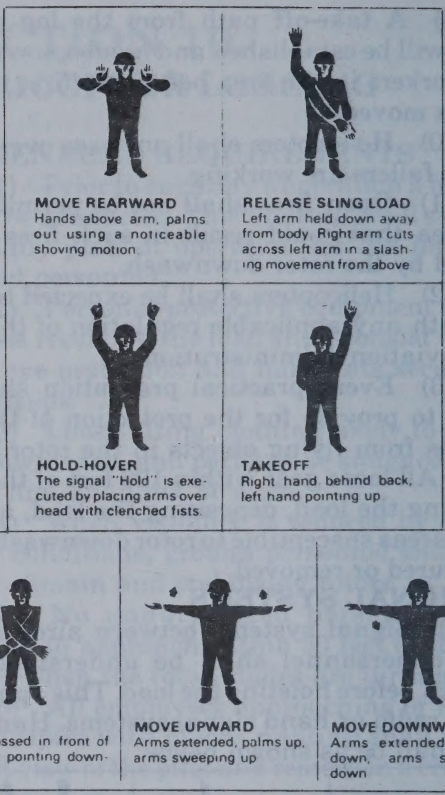
(1) Signal systems between aircrew and ground personnel shall be understood and checked before hoisting the load. This applies to either radio or hand signal systems. Hand signals shall be as shown below:



MOVE RIGHT
Left arm extended horizontally, right arm sweeps upward to position over head.

MOVE LEFT
Right arm extended horizontally, left arm sweeps upward to position over head.

MOVE FORWARD
Combination of arm and and movement in a collecting motion pulling toward body.


MOVE REARWARD
Hands above arm, palms out using a noticeable shoving motion.
RELEASE SLING LOAD
Left arm held down away from body. Right arm cuts across left arm in a slashing movement from above.
HOLD-HOVER
The signal "Hold" is executed by placing arms over head with clenched fists.
TAKEOFF
Right hand behind back, left hand pointing up.
LAND
Arms crossed in front of body and pointing downward.
MOVE UPWARD
Arms extended, palms up, arms sweeping up
MOVE DOWNWARD
Arms extended, palms down, arms sweeping down

(2) There shall be constant reliable communication between the pilot and a designated signalman during the period of loading and unloading. This signalman shall be clearly recognizable from other ground personnel.

(3) The helicopter shall be equipped with a siren to warn workers of hazardous situations.

C. LOADING LOGS

(1) It shall be the responsibility of the firm, supervisor or person who is in charge of the actual loading operation to comply with the Section in these rules applicable to log loading.

(2) The helicopter operator shall be responsible for the size, weight, and manner in which loads are attached to the helicopter. If, for any reason, the helicopter operator believes the lift cannot be made safely, the lift shall not be made.

(3) When employees are required to perform work under hovering aircraft, a safe means of access shall be provided for employees to reach the hoist line hook and engage or disengage cargo slings.

(4) Employees shall not work under hovering aircraft except while hooking or unhooking loads.

(5) The weight of an external load shall not exceed the manufacturer's rating.

(6) The hook-up crew shall not work on slopes below felled and bucked timber.

(7) When grapples, or similar devices are used, the log holding device shall be lowered to the ground and placed on its side whenever the operator is out of the normal operator's work station.

(8) Static charge on the suspended load shall be dissipated with a grounding device before ground personnel touch the load, or protective rubber gloves shall be worn by all ground personnel touching the suspended load.

D. LOADING AND LANDING AREAS

(1) The minimum dimensions of a drop zone shall be determined by the length of the logs being hauled. All zones shall be at least 1½ times as long and as wide as the length of the average log being harvested. In conjunction with the drop zone and out from under the flight path a landing area of no less than 1/3 acre shall be provided.

(2) Logs shall not be landed within 125 feet of landing or loading machinery.

(3) Landing crew shall be in the clear before logs are landed.

(4) The approach to the landing shall be clear and long enough to prevent tree tops from being pulled onto the landing.

(5) Separate areas shall be designated for landing logs and fueling helicopters.

(6) Except for pulling lines or conductors, hoist wires or other gear that are allowed to "pay out" from a container or roll off a reel shall not be attached or allowed to foul on any fixed ground structure.

(7) Sufficient ground personnel shall be provided for safe helicopter loading and unloading operations.

(8) A clear area shall be maintained in all helicopter loading and unloading areas.

(9) Emergency landing areas made especially for injured workers shall be located within reasonable distance from all working areas.

E. CARGO HOOKS AND CHOKERS

(1) The electrical activating device of all electrically operated cargo hooks shall be designed and installed to prevent inadvertent operation. In addition, these cargo hooks shall be equipped with an emergency mechanical control for releasing the load. The hooks shall be tested prior to each day's operation to determine that the release functions properly.

(2) Logs will be laid on the ground and the helicopter completely free of the chokers before workers approach the logs.

(3) One end of all the logs in the turn shall be touching the ground and lowered to an angle of not more than 45° from the horizontal before the chokers are released.

(4) If the load must be lightened, the hook shall be placed on the ground on the uphill side of the turn before the hooker approaches to release the excess logs.

SECTION 11.
SIGNALS AND COMMUNICATIONS SYSTEMS

A. GENERAL REQUIREMENTS

(1) Standard yarding system whistle signals or an approved alternate communication system shall be used at cable logging operations. An approved alternate communication system is one approved by the Division of Workers' Compensation, which by radio or radio tooter or radio voice tooter or other media than horn or whistle provides a safe method of communication between crew members. A voice system may only be used as an alternate while the primary system is being repaired.

(2) A new signal may be adopted for an unusual or new situation not covered in the standard signals; however, the new signals must be used only for that specific situation.

(3) The standard whistle signals shall be posted on the yarder and other places where crews congregate.

(4) If an alternate signal system is used, it shall also be posted.

(5) Signals shall be thoroughly understood by the crew.

(6) Each unit of the signal or control system in use shall be tested daily before operations begin.

(7) Audible signals used for test purposes shall not include signals used for movement of

lines or materials.

(8) Any person is authorized to give a stop-signal when a worker is in danger or another emergency condition is apparent.

(9) All persons shall be in the clear before a signal is given to move a log, load, or rigging. Rigging shall be moved only by standard signals or approved alternate system.

(10) Machine operators shall not move any logs, loads, or rigging unless the signal received is clear and distinct. If in doubt, the operators shall repeat the signal as understood and wait for confirmation.

(11) Hand signals are permitted only when in plain sight of and within 300 feet of the operator. Hand signals may be used at any time as an emergency stop signal.

(12) Throwing of any type of material as a signal is strictly prohibited.

(13) The use of a jerk wire whistle system for any type of yarding operation is prohibited.

(14) Machine operator, radio or other means must activate the audible signaling device when an approved alternate system is used.

(15) Audible signals are not necessary on grapple or other yarding systems if workers are not exposed to logs or rigging movement.

(16) Log loading machines and yarders shall be equipped with audible signaling devices which shall be of a different tune than other signaling devices in the vicinity.

B. ELECTRIC SIGNAL SYSTEMS

(1) Where an electrical signal system is used, all wire attachments and connectors shall be of the weatherproof type.

(2) Electric signal systems shall be properly installed and adjusted. They shall be protected against accidental signaling, and shall be maintained in good operating condition at all times.

(3) Switches shall be designed so that they cannot be accidentally tripped.

SECTION 12.
FIRST AID

A. GENERAL REQUIREMENTS

(1) Immediate suitable means of transportation shall be available at the site of all logging operations for use in the event an employee is seriously injured. This vehicle shall have the right of way over all other vehicles under the control of the employer.

(2) Every operator shall arrange for telephone or radio communication at the nearest reasonable point and shall work out a specific plan of action in the event of serious injury to any employee. (Any injury which would possibly require the immediate attention of a doctor shall be considered serious.)

(3) Transportation shall be of a nature to allow reasonable comfort to an injured employee. Careful handling to prevent further injury, first aid treatment, and proper transportation is practically always more important than the elapsed time in reaching the hospital.

(4) Caution shall be used in removing a helpless or unconscious person from the scene of an accident to prevent further injury.

(5) Except in cases of extreme emergency, first aid treatment shall only be rendered by a person of competence and ability.

(6) Employers should arrange to have as many persons as possible take the course in first aid as outlined by the American Red Cross

and/or the U.S. Bureau of Mines.

(7) At least one employee on every work crew shall be trained in first aid procedure.

(8) A first aid kit, stretcher and two blankets shall be available at all operations and at each location where crew distribution so warrants.

(a) First aid kits shall be in metal or other sanitary containers. Such containers shall be designed and constructed as to be impervious to any existing conditions of weather, dust, dirt, or other foreign matter.

(b) Supplies shall be sterile, and drugs shall be labeled with their common name and the special use clearly defined.

(c) An approved manual on first aid shall be contained in each kit.

(d) Kits shall be readily available and kept fully supplied at all times. They are not intended to supplement the physician but to render first aid to injured employees, and treat minor injuries properly.

(9) All first aid kits shall contain adequate supplies to handle anticipated emergencies. At least #10 unit kit is recommended.

SECTION 13.
DEFINITIONS

(1) "A-frame" means a structure made of two independent columns fastened together at the top and separated a reasonable width at the bottom to stabilize the unit from tipping sideways.

(2) "A side" means any designated portion or group which works toward the same final point of loading.

(3) "An operation" means any place where logging is being done.

(4) "Arch" means any device attached to the back of a vehicle and used for raising one end of logs to facilitate movements.

(5) "Authorized person" means a person approved or assigned by management to perform a specific type of duty or duties or to be at a specific location or locations in the work area.

(6) "Bird Caging" means when the cable strands are inverted and rolled.

(7) "Blasting accessories" means equipment used when loading or firing explosives. It does not include explosives or detonators.

(8) "Blasting agent" means any material consisting of a mixture of a fuel and oxidizer which — (a) is used or is intended for use in blasting; (b) is not classed as an explosive by the Department of Transportation; (c) contains no ingredient classed as an explosive by the Department of Transportation; and (d) cannot be detonated by a No. 8 blasting cap when tested.

(9) "Blasting area" means the area near blasting operations in which concussion of flying material can reasonably be expected to cause injury.

(10) "Blasting cap" means a detonator containing a charge of detonating compound, which is ignited by electric current, or the spark of a fuse. It is used for detonating explosives.

(11) "Blasting circuit" means electric circuits used to fire electric detonators or to ignite an ignitor cord by means of an electric starter.

(12) "Blasting switch" means a switch used to connect a power source to a blasting circuit.

(13) "Blocks" means a wooden or metal case enclosing one or more pulleys used to lead a line in a specific direction, and provided with a hook, eye or strap by which the unit may be attached to an object.

(14) "Bolsters" — See Bunks.

(15) "Bunk bindings" means a cable that is attached to the bunk stakes.

(16) "Bunk blocks" means pins that hold the bunks from turning (same as bunk locks).

(17) "Bunks" means a crossbeam on a transport vehicle on which the logs rest.

(18) "Buss wires" when blasting in parallel, means those wires to which leg wires of the electric blasting caps are fastened.

(19) "Capped fuse" means a length of safety fuse to which blasting cap or detonator has been attached.

(20) "Capped primer" means a package or cartridge of explosives which is specifically designed to transmit detonation to other explosives and which contains a detonator.

(21) "Cats' paws" means the hitch generally tied in a sling or continuous wreath of rope.

(22) "Chokers" means a length of wire rope with attachment for encircling the end of a log to be yarded.

(23) "Chunking" means the clearing of non-usable material from a specified area.

(24) "Cold deck" means any pile of logs which is yarded and left for future removal.

(25) "Cross Haul Loading" means a variation of roll-way loading using a cable and skidder to pull logs onto a truck. Also "Parbuckle Loading".

(26) "Crew Buses" is a vehicle which will carry six (6) persons or more.

(27) "Crotch line" means two short lines attached to the same ring for loading or unloading.

(28) "D or strap socket" means a socket with a closed loop and arranged to be attached to the end of line.

(29) "Deadman" a completely buried anchor, often a log.

(30) "Dogged" means to stop and hold load or rigging.

(31) "Electric blasting cap" means a blasting cap designed for and capable of being initiated by means of an electric current.

(32) "Electrical grounding" means to connect with the ground to make the earth part of the circuit.

(33) "Electric started" means a shell containing an ignition charge designed to be ignited by an electric current. It is used to fire an ignitor cord.

(34) "Emergency" means an unforseen combination of circumstances or the resulting state that calls for immediate action.

(35) "Employee" means a person who works for wages or salary in the service of an employer.

(36) "Employer" means a person or organization which hires one or more persons to work for wages or salary.

(37) "Explosive" means any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. Explosives include, but are not limited to, black powder, dynamite, nitro-glycerine, fulminite, ammonium nitrate when mixed with a hydrocarbon, and other blasting agents.

(38) "Fairleads" means a device that consists of pulleys or rollers arranged to permit reeling in a cable from any direction.

(39) "FOPS" means falling object protective structures.

(40) "Grab-iron" means an iron rod welded for a hand hold.

(41) "Grapple" means a hinged set of jaws capable of being opened and closed, used to grip logs during yarding or loading.

(42) "Guylines" means a wire rope used as a guy.

(43) "Haulback block" means a block in a cable yarding system used to guide the haulback line.

(44) "Heel block" means the block hung on a boom through which the line operates.

(45) "Heel boom" means a type of loading boom where one grapple is used on the log and is pulled up against the boom.

(46) "Heel hold up strap" means the strap secured to the boom to hold the heel block.

(47) "Hot deck" means a landing where logs are constantly being moved.

(48) "Jack" means two heavy pieces of metal bolted together with spacers between, used to hang in a tree to hold up an anchored skyline, or inverted on a guyline to hold a lead block to tailhold.

(49) "Jagger" means any projecting broken strand of cable.

(50) "Knob" means a metal ferrule arranged to be attached to the end of the line.

(51) "Landing" means any place where logs are laid after being yarded awaiting loading.

(52) "Lead wires or temporary wires" means those wires extending from the connecting wires or leg wires to the permanent blasting wire.

(53) "Loader" means the worker who picks out the logs and supervises the way they are to be placed on the transporting equipment.

(54) "Loading boom" means any structure projecting from a pivot point to guide a log when lifted.

(55) "Logs" shall mean logs, poles and piling, peeler bolts, blocks, and cores.

(56) "Magazine" as used herein means any building or other structure other than a factory building, used for the storage of explosives.

(57) "Marlin spikes" means an iron tool that tapers to a point and is used to separate strands of wire rope (as in splicing).

(58) "Misfire" means the completed or partial failure of the blasting charge to explode as planned.

(59) "Molles" means (a) A circle of twisted strands of wire rope used as temporary line to connect the eye splices of two lines; (b) A ring of wire used to replace a cotter pin.

(60) "Mudcapping" means blasting by placing a quantity of explosives with detonator on or against the object to be blasted. This is also known as bulldozing or plaster shooting.

(61) "Mule train" means two or more trailers.

(62) "Mushroom" means to well up and spread out laterally from a central source.

(63) "Needles" means the same as marlin spike.

(64) "Pass block" means a light block hung at the top of a tail tree and used to haul up the bull block and other gear in rigging the tree.

(65) "Pass line" means a small line threaded through a block at the top of a tail tree to assist the high climber.

(66) "Permanent blasting wires" means those wires between the main blasting switch and the point where lead wires are connected.

(67) "Pinch point" means any point other than the point of operation at which it is possible for parts of the body to be caught between moving parts.

(68) "Portable spar or tower" means an engineered structure designed to be used in a manner similar to which a wooden spar tree would be used.

(69) "Powder" means an explosive other than the detonating agent.

(70) "Power drum" means a drum that has to use power to release the load.

(71) "Primer" means a cartridge of explosive with a detonator inserted therein.

(72) "Receding line" means the line on a skidder or slackline on a yarder.

(73) "Reload" means an area where logs are dumped and reloaded.

(74) "Rigging" means the cables, blocks, and other equipment used in yarding and loading logs.

(75) "Rolled eyes" means cable that has been rolled into an eye, then spliced.

(76) "Rollway" means any place where logs are dumped.

(77) "ROPS" means roll-over protective structure.

(78) "Running line" means any line which moves.

(79) "SAE" means Society of Automotive Engineers.

(80) "Safety fuse" means a train of powder enclosed in cotton, jute yarn, and waterproofing compounds, which burns at a uniform rate used for firing a cap containing the detonating compound which in turn sets off the explosive charge.

(81) "Safety switch" means the sectionalizing switch that also provides shunt protection in blasting circuits between the blasting switch and the shot area.

(82) "Sail Guy" means a single guy passing through a strap at boom tip and fastened to an adjustable drum fastened to top of a leaning boom on a yarder with a rotating upper unit. Used to supplement the resistance of the counterweight and occasional outrigger. Sail guys go slack as the yarder swings from the lead.

(83) "Scaler" means the worker who measures the diameter and length of the logs and calculates the footage or volume.

(84) "Sidewinders" means to turn in a series of circular motions.

(85) "Signal man" means the person who gives signals to a machine operator.

(86) "Skidding" means movement of logs on surface of ground toward the place where they are to be loaded.

(87) "Skidway" means any group of timbers spaced a short distance apart on which logs are rolled.

(88) "Skyline" means the line which is hung between the yarder or tailhold on which a carriage or block travels.

(89) "Slack line" means a form of skyline where skyline is spooled on the drum of yarder and can be raised or lowered.

(90) "Slack puller" means any weight or mechanical device or employee used to increase the movement of a line when its own is inadequate.

(91) "Snag" means a standing dead tree.

(92) "Snubbing line" means a line used in skyline logging to retard a load.

(93) "Soft hammer" means a hammer of soft material not case hardened.

(94) "Stray current" means that portion of a total electric current that flows through paths other than the intended circuit.

(95) "Stiff boom" means any anchored stationary boom sticks tied together on which boom persons work.

(96) "Strap" means any short piece of line with eye or D in each end.

(97) "Straw line" means a small hand line used for miscellaneous purposes.

(98) "Strip" means a definite location of timber allocated on which a cutting crew works.

(99) "Swamping" means the falling of brush around or along a specified place.

(100) "Swifter" means the means of tying boom sticks together to prevent them from spreading while being towed.

(101) "Tail hold" means an anchor used for making fast any line or block.

(102) "Tail tree" means the tree at the opposite end from the tower or yarder on which the skyline or other rigging is hung.

(103) "Tight line" means when power is exerted on both main lines and haulback at the same time.

(104) "Tilt clamp" means a clamp that will tilt from side to side.

(105) "Tong line block" means the block hung in a boom through which the tong line operates.

(106) "Transfer" used in loading shall mean changing of logs in a unit from one means of transportation to another.

(107) "Tree jacks" means a J-shaped member used for skyline support at intermediate tail tree.

(108) "Turn" means any log or group of logs attached by some means to power and moved from a point of rest.

(109) "Wheel guard" is any safety device which will guide wheels in direction intended if steering falters.

(110) "Wing log" means the log on the outside of the load on the truck.

(111) "Wire rope reefing" means the load on each rope part equal to the weight of the load supported.

(112) "Yarding" means movement of logs from the place they are felled to the landing.

GUIDELINES FOR RIGGING

The following tables and illustrations are presented as suggested guidelines that may be used in rigging logging machines.

TABLES 1-1 AND 1-2

Table 1-1 illustrates the number of degrees and percentage of slope for the guyline attached to the point of boom as they relate to the angle of the boom. The safe angle of the boom may range from 60° to 78° according to crane manufacturers specifications. Once the boom angle is determined these tables will disclose either the safest degree of angle or the safest percentage of slope for attaching guylines. Degrees or percentages below the machine are indicated by a (-) minus. Degrees or percentages above the machine are indicated by a (+) plus.

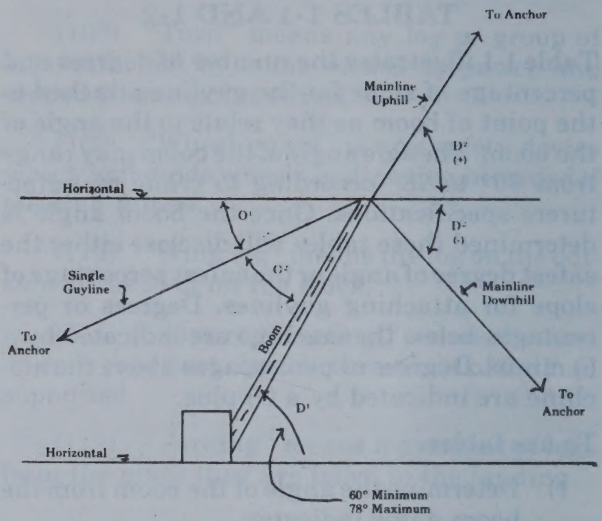
To use tables:

1) Determine the angle of the boom from the boom angle indicator;

2) Go to the table to determine the safest angle or percent of slope for the mainline (D^2) and the single guyline O.

Table 1-2 illustrates the number of degrees and percentage of slope for guylines attached to the top of the gantry as they relate to the angle of the gantry.

Guylines Attached to Point of the Boom

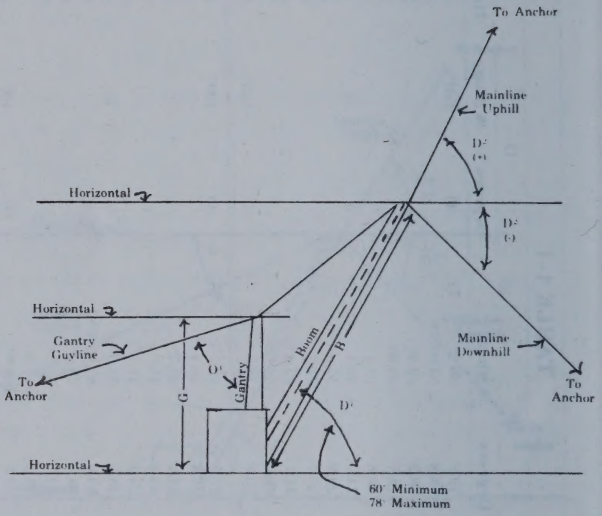


To obtain a 30% safety factor over the mainline cable, the guyline cable area must equal 1.5 x 1.3 = 1.95 x Mainline Cable Area.

TABLE 1-1

D	D		O		D	D		O	
	Degrees	% Slope	Degrees	% Slope		Degrees	% Slope	Degrees	% Slope
60	-45	-100%	19.9	36.2%	72	-45	-100%	35.6	71.5%
	-38.7	-80%	18.8	34.0%				33.4	66.0%
	-31.0	-60%	18.2	32.9%				31.5	61.3%
	-21.8	-40%	18.7	33.9%				30.3	58.4%
	-11.3	-20%	20.8	38.1%				30.5	59.0%
	0	0%	24.7	46.1%		0	0%	32.7	64.1%
	+11.3	+20%	29.9	57.6%				36.5	73.9%
	+21.8	+40%	35.7	71.7%				41.2	87.5%
	+31.0	+60%	41.1	87.4%				46.1	103.8%
	+38.7	+80%	46.0	103.5%				50.5	121.4%
	+45	+100%	50.1	119.5%		+45	+100%	54.4	139.6%
66	-45	-100%	27.5	52.1%	78	-45	-100%	44.0	96.6%
	-38.7	-80%	25.8	48.4%				41.4	88.3%
	-31.0	-60%	24.6	45.7%				38.9	80.8%
	-21.8	-40%	24.2	45.0%				36.9	75.2%
	-11.3	-20%	25.4	47.6%				36.2	73.2%
	0	0%	28.5	54.3%		0	0%	37.3	76.2%
	+11.3	+20%	33.0	65.0%				40.2	84.6%
	+21.8	+40%	38.3	79.0%				44.4	97.8%
	+31.0	+60%	43.5	95.0%				48.8	114.3%
	+38.7	+80%	48.2	111.8%				53.0	132.8%
	+45	+100%	52.2	128.8%		+45	+100%	56.7	152.3%

Guylines Attached to the Top of the Gantry



B = Boom Length 25' to 75'
G = Gantry Height 25' to 40'

TABLE 1-2

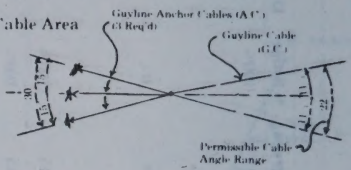
Condition	D		O		Condition	D		O	
	Degrees	% Slope	Degrees	% Slope		Degrees	% Slope	Degrees	% Slope
D = 60	-45	-100%	15.0°	26.8%	D = 72	-45	-100%	27.0°	51.0%
	-38.7	-80%	8.7°	15.3%				20.7	37.8%
	-31.0	-60%	1.0°	1.8%				13.0	23.1%
	-21.8	-40%	8.2°	14.4%				3.8	6.6%
	-11.3	-20°	18.7°	33.9%				6.7	11.8%
	0	0%	30.0°	57.7%		0°	0%	18.0	32.5%
	+11.3	+20%	41.3°	87.9%				29.3	56.1%
	+21.8°	+40%	51.8°	127.1%				39.8	83.3%
	+31.0	+60%	61.0°	180.4%				49.0	115.0%
	+38.7	+80%	68.7°	256.5%				56.7	152.2%
	+45	+100%	75.0	373.2%		+45	+100%	63.0	196.3%
D = 66°	-45	-100%	21.0°	38.4%	D = 78°	-45	-100%	33.0°	64.9%
	-38.7°	-80%	14.7°	26.2%				26.7	50.3%
	-31.0	-60%	7.0°	12.3%				19.0	34.4%
	-21.8	-40%	2.2°	3.8%				9.8	17.3%
	11.3	-20%	12.7°	22.5%				0.7	1.2%
	0	0%	24.0	44.5%		0	0%	12.0	21.3
	+11.3	+20%	35.3°	70.8%				23.3	43.1%
	+21.8	+40%	45.8	102.8%				33.8	66.9%
	+31.0	+60%	55.0	142.8%				43.0	93.3%
	+38.7	+80%	62.7	193.8%				50.7	122.2%
	+45	+100%	69.0°	260.5%		+45	+100%	57.0	154.0%

TABLE 1-3

Guyline Cable Anchors

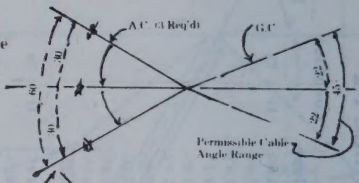
Case I

Minimum Anchor
Cable Area = .75 x Guyline Cable Area



Case II

Minimum Anchor
Cable Area = .77 x Guyline
Cable Area



Case III

Minimum Anchor
Cable Area = .83 x Guyline
Cable Area

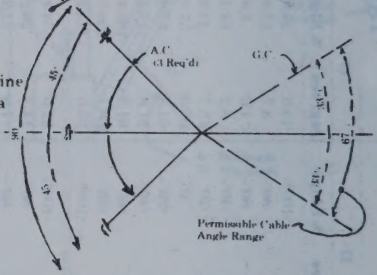


TABLE 2-1

This table can be referred to to determine the safest guyline cable to be used when multiple supporting lines are required on either tail trees or a gantry. The table will only apply if cables of equal construction are used. First determine from the logging machine:

(a) The length of the boom;
(b) The gantry length;
(c) The mainline cable diameter.

Once these factors are known go to the table to find the minimum suggested cable diameter for the guyline cables.

TABLE 2-1

Boom Length	Gantry Length	Mainline Cable Diameter 9/16	5/8	3/4	7/8
		Suggested Minimum Guyline Cable Diameter			
75'	25'	3/4	3/4	7/8	1.00
	30'	5/8	3/4	7/8	1.00
	35'	9/16	5/8	3/4	7/8
	40'	9/16	9/16	3/4	7/8
65'	25'	5/8	3/4	7/8	1.00
	30'	9/16	5/8	3/4	7/8
	35'	1/2	9/16	3/4	7/8
	40'	1/2	9/16	5/8	3/4
55'	25'	9/16	5/8	3/4	7/8
	30'	1/2	9/16	3/4	7/8
	35'	1/2	9/16	5/8	3/4
	40'	7/16	1/2	5/8	3/4
45'	25'	1/2	9/16	3/4	7/8
	30'	1/2	1/2	5/8	3/4
	35'	7/16	1/2	9/16	3/4
	40'	7/16	7/16	9/16	5/8
35'	25'	7/16	1/2	5/8	3/4
	30'	7/16	7/16	9/16	5/8
	35'	3/8	7/16	1/2	5/8
25'	25'	3/8	7/16	1/2	5/8

TABLE 3-1

The sum total effectiveness of all guylines should equal or exceed 200 percent of the breaking strength of the largest line as determined by the following guide.

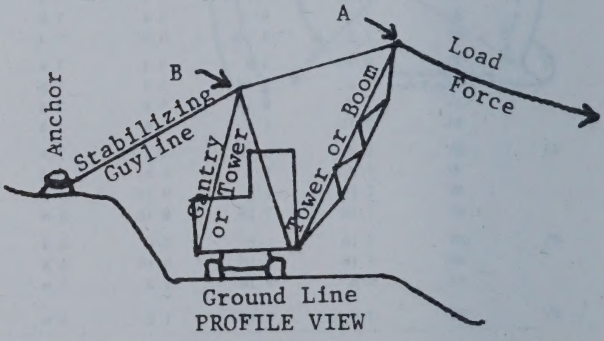
a. Guyline effectiveness as a ratio of tower or boom height.

A = height above ground at which load is applied to the yarder's tower or boom by turn of logs.

B = height above ground at which guyline is attached to stabilize the yarder or tower.

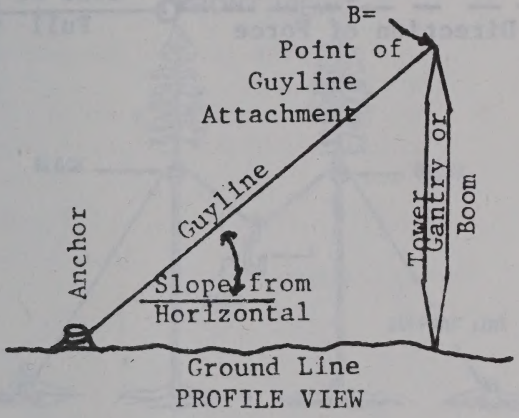
RATIO = B (in feet) ÷ A (in feet)

Ratio	=	Effective
1.0+	=	35%
.9+	=	30%
.8+	=	27%
.7+	=	23%
.6+	=	20%
.5%	=	17%



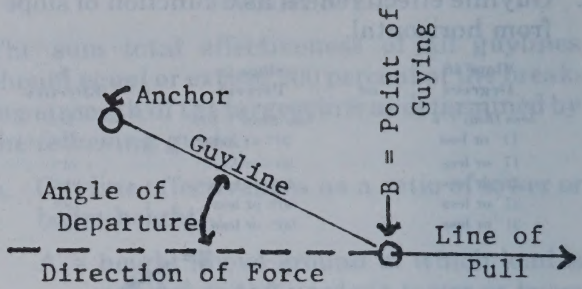
b. Guyline effectiveness as a function of slope from horizontal.

Slope in Degrees	or	Slope in Percent	=	% Effective
less than ± 6°		less than ± 10%	=	30%
11° or less		20% or less	=	27%
17° or less		30% or less	=	24%
22° or less		40% or less	=	21%
27° or less		50% or less	=	18%
31° or less		60% or less	=	16%



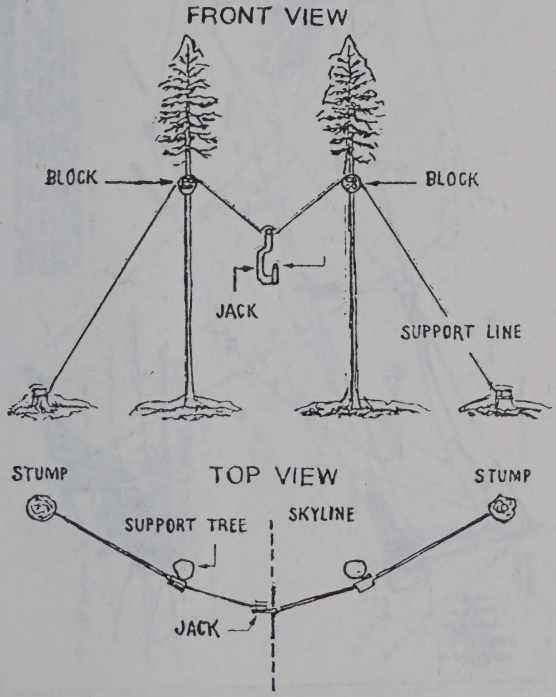
c. Guyline effectiveness as a function of departure from direction of force or line of pull. Guyline on each side of the line or pull should approximately balance each other.

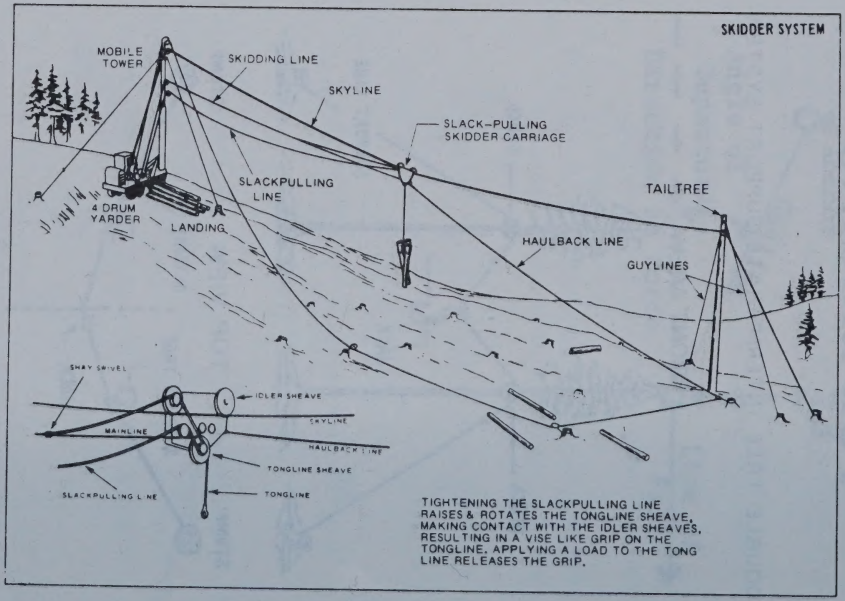
Degrees of Departure	=	% Effective
less than 10°	=	28%
less than 20°	=	22%
less than 30°	=	17%
less than 40°	=	12%
less than 50°	=	8%


Anchor
Guyline
Angle of
Departure
Direction of Force
B = Point of
Guying
Line of
Pull

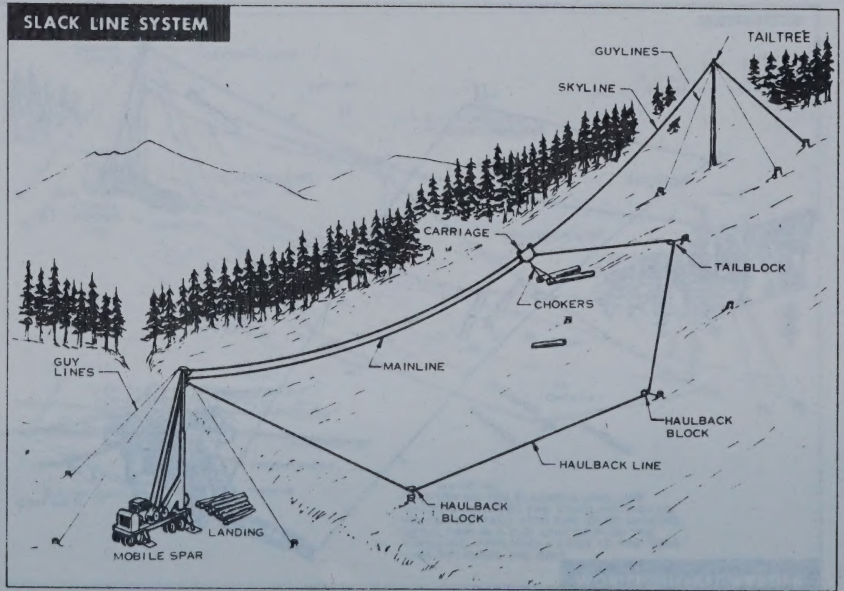
ILLUSTRATIONS FOR RIGGING

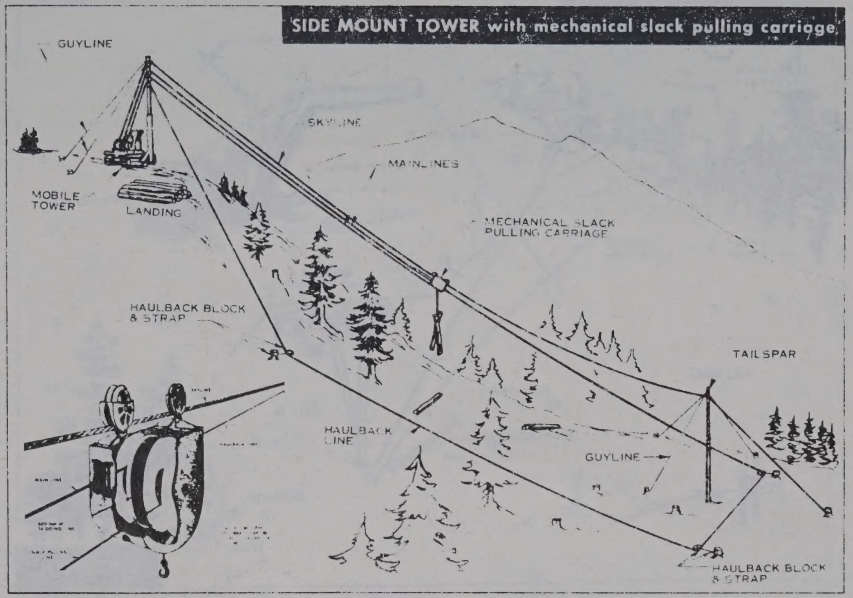
DOUBLE TREE INTERMEDIATE SUPPORT SYSTEM

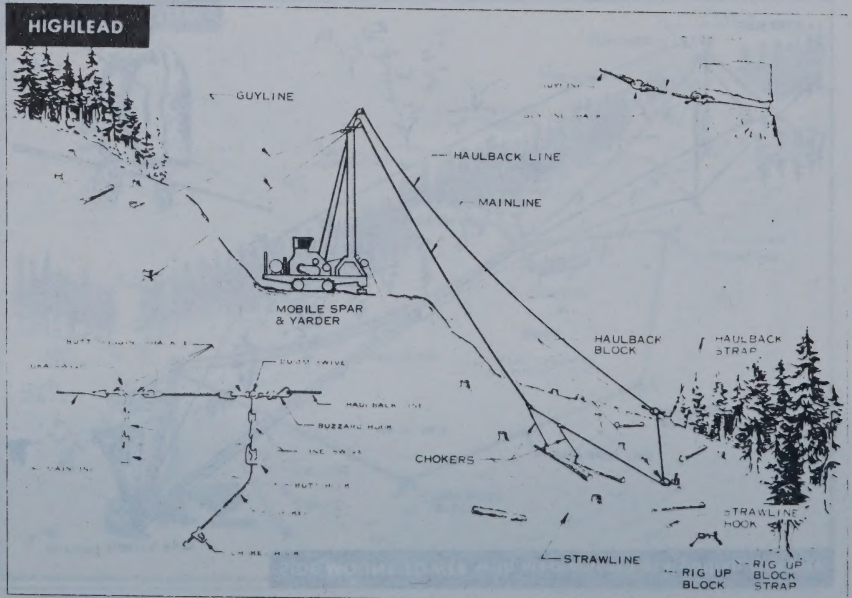



SKIDDER SYSTEM
MOBILE TOWER
SKIDDING LINE
SKYLINE
SLACK-PULLING SKIDDER CARRIAGE
SLACKPULLING LINE
4 DRUM YARDER
LANDING
TAILTREE
HAULBACK LINE
GUYLINES
SHAY SWIVEL
IDLER SHEAVE
SKYLINE
MAINLINE
HAULBACK LINE
TONGLINE SHEAVE
SLACKPULLING LINE
TONGLINE
TIGHTENING THE SLACKPULLING LINE RAISES & ROTATES THE TONGLINE SHEAVE, MAKING CONTACT WITH THE IDLER SHEAVES, RESULTING IN A VISE LIKE GRIP ON THE TONGLINE. APPLYING A LOAD TO THE TONG LINE RELEASES THE GRIP.

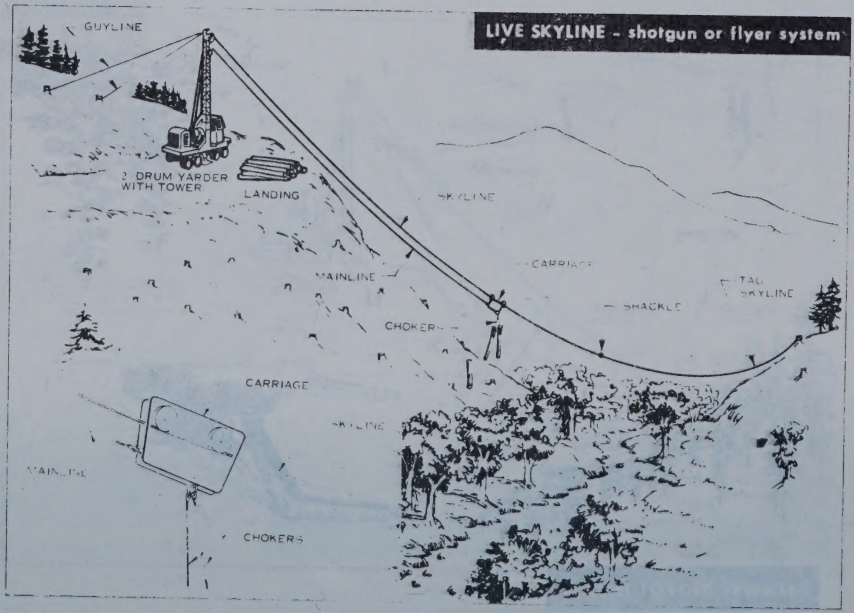
MOBILE SHOVEL YARDER
GUYLINES
MOBILE SHOVEL YARDER
LANDING
HAULBACK LINE
MAINLINE
CHOKERS


SLACK LINE SYSTEM
GUYLINES
TAILTREE
SKYLINE
CARRIAGE
TAILBLOCK
CHOKERS
GUY LINES
MAINLINE
HAULBACK BLOCK
HAULBACK LINE
HAULBACK BLOCK
LANDING
MOBILE SPAR


SIDE MOUNT TOWER with mechanical slack pulling carriage
GUYLINE
SKYLINE
MAINLINES
MOBILE TOWER
LANDING
MECHANICAL SLACK PULLING CARRIAGE
HAULBACK BLOCK & STRAP
TAILSPAR
HAULBACK LINE
GUYLINE
HAULBACK BLOCK & STRAP


HIGHLEAD
GUYLINE
HAULBACK LINE
MAINLINE
MOBILE SPAR
& YARDER
HAULBACK
BLOCK
HAULBACK
STRAP
CHOKERS
STRAWLINE
HOOK
STRAWLINE
RIG UP
BLOCK
RIG UP
BLOCK
STRAP

SHOVEL LOADER JAMMER


LIVE SKYLINE - shotgun or flyer system
GUYLINE
2 DRUM YARDER WITH TOWER
LANDING
SKYLINE
CARRIAGE
MAINLINE
SHACKLE
TAIL SKYLINE
CHOKERS
CARRIAGE
SKYLINE
MAINLINE
CHOKERS

NOTES

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NOTES

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